

BULLETIN OF MISCELLANEOUS
INFORMATION No. 6 1938
ROYAL BOTANIC GARDENS, KEW

XXXV—ADDITIONS TO THE FLORA OF BORNEO AND
OTHER MALAY ISLANDS: IX.* H. N. RIDLEY.

MALVACEAE.

Sida retusa Linn.

DUTCH S. E. BORNEO. Banjarmasin, *Motley* 804.

BRIT. N. BORNEO. Papan, *Motley*.

Abutilon graveolens Wight var. **hirtum** Mast.

BRIT. N. BORNEO. Lahat Datu, *Creagh*.

Wissadula periplocifolia Thw.

DUTCH S. E. BORNEO. Banjarmasin, *Motley* 293.

Urena lobata Linn.

Besides the common form, the variety **scabriuscula** DC. occurs at Sandakan, *Elmer* 20524, and the variety **tomentosa** Bl. on the Sarawak River, *Haviland* 31.

Hibiscus radiatus Cav.

BRIT. N. BORNEO. Labuan, *Burbidge*.

BOMBACACEAE.

Durio cupreus Ridley, sp. nov., a *D. lanceolato* Mast., cui affinis, foliis valde coriaceis ovatis acuminatis cuspidatis, nervis ferme omnino occultis differt.

Arbor, cortice rugoso, ramis superne angulatis lepidotis. *Folia* ovata, cuspidata, basi leviter attenuata, obtusa, 8.5–10.5 cm. longa, 4–6 cm. lata, coriacea, supra laevia, nervis occultis, subtus cuprea, densissime lepidota, costa elevata, nervis inconspicuis circiter 12-paribus; petioli 1.2–1.5 cm. longi. *Flores* in ligno vetustiore fasciculatim congesti, 8 in panicula 1 cm. longa, pedunculis crassis lepidotis 1 cm. longis. *Calyx* urniformis, lepidotus, margine obscure lobatus, haud fissus, 1.5 cm. longus. *Petala* extra pilis stellatis tecta, intus glabra. *Staminum* filamenta omnia libera.

SARAWAK. Three miles from Kuching, *Haviland* 1803.

This species is quite distinct from any other in its ovate cuspidate-acuminate leaves, very coriaceous with the nerves almost completely invisible. In the free stamens it is most nearly allied to *D. lanceolatus* Mast. The only advanced bud which I have seen was not fully developed.

* Continued from K.B. 1938, 176.

***Sterculia Scortechinii* King.**

SARAWAK. Two and a half miles from Kuching, *Haviland* 920.

***Sterculia bicolor* Mast.**

SARAWAK. Kuching, *Haviland* 961: "A small tree, flowers pale green." Kuching, *Haviland & Hose* 3405: "Leaves pale below, flowers pink at base inside, hairs on outside pink."

***Sterculia luzonica* Warb.**

A fruiting specimen apparently of this Philippine plant was obtained by *Creagh* at Mabul, East Coast, BRIT. N. BORNEO.

***Sterculia subpeltata* Bl. var. *velutina* Ridley, var. nov., a typo differt foliis subtus et petiolis et inflorescentia dense rufo-velutinis.**

SARAWAK. Miri, *Hose* 657; Baram, *Hose* 97.

This quite resembles the Javanese and Sumatran plant except for its much denser red indumentum.

***Sterculia laevis* Wall.**

SARAWAK. Kuching, *Haviland* 1621; 1763.

BRIT. N. BORNEO. Sandakan, *Creagh*.

These seem to be identical with the common Malay plant and form a new record.

***Sterculia Hewittii* Ridley, sp. nov., a *S. laevi* Wall., cui affinis, floribus minoribus, foliis anguste lanceolatis acuminatis differt.**

Frutex parvus, glaber. *Folia* lanceolata, acuminata, basi obtusa, chartaceo-coriacea, glabra, 9–17 cm. longa, 3.5 cm. lata, nervis subtus elevatis 7–10-paribus intra margines inarcuantibus; petioli graciles, apice et basi incrassati, 1.5–2.7 cm. longi. *Paniculae* multiflorae, laxae, 7–12 cm. longae, pedicellis gracilibus 2 mm. longis pubescentibus. *Bractaeae* lanceolatae, acuminatae, 3 mm. longae. *Flores masculi*: *Calyx* globosus, cupulatus, hirtus, 4 mm. longus, lobis linearibus hirtis 4 mm. longis. *Androecii* stipes brevis, crassus, apice deflexus, antheris 5 oblongis curvis. *Flores feminei* non visi. *Folliculi* lanceolati, apicibus curvis, velutini, 6 cm. longi, 3.5 cm. lati. *Semina* 4, subglobosa.

SARAWAK. Baram, *Haviland & Hose* 3738; *Hewitt* (type).

DUTCH BORNEO. Banjarmasin, *Motley* 1033: "Small shrub, flowers greenish."

Allied to *S. laevis* Wall., but very distinct in its narrow stiff leaves with numerous nerves.

***Sterculia rhoidifolia* Stapf mss., descr. Ridley, sp. nov., a *S. rhynchophylla* K. Schum. foliis rigidis obovatis paucinerviis, floribus majoribus urceolatis differt.**

Arbor parva. *Perulae* lanceolatae, acuminatae, hirtae, 4 mm. longae. *Folia* in apicibus ramorum congesta, obovata, obtusa, basi acuminata, 8–9 cm. longa, 4–4.5 cm. lata, coriacea, supra laevia, subtus glabra, nervis tenuibus 5-paribus, nervulis paucis,

reticulationibus minutis ; petioli 1.5–2 cm. longi. *Paniculi* plures, in axillis terminalibus, graciles, parce furfuraceae, 10–11 cm. longae, ramis 2 cm. longis. *Pedicelli* graciles, 5 mm. longi. *Flores masculi* : *Calyx* urceolatus, glaber, 5 mm. longus, lobis 5 linearibus incurvis hirtis 7 mm. longis. *Androecii* stipes crassus, conicus, antheris 10 minutis. *Flores feminei* non visi. *Folliculi* 5, subglobosi, tomentosi, 4 cm. longi, 4 cm. lati. *Semina* oblonga, nigra, 1.5 cm. longa.

SARAWAK. Kuching, pedicels and calyx reddish, *Haviland* 2123 (type), 2124 ; Baram, *Hose* 104.

I know nothing very closely allied to this species : its stiff obovate leaves in a terminal tuft with the many-flowered panicles make it different from any other species. It has somewhat the habit of *S. rhynchophylla* K. Schum., but in details it is quite diverse.

***Sterculia arachnifera* Ridley**, sp. nov., a *S. gracili* Korth., cui affinis, foliis lanceolatis nervis pluribus et foliorum petiolis et floribus hirtis differt.

Frutex, ramulis junioribus rufo-hirtis. *Perulae* ovatae, breves, rufo-hirtae. *Folia* lanceolata, acuminata, cuspidata, basi obtusa, chartacea, supra glabra, subtus pilis stellatis paucis dissitis tecta, 10–12 cm. longa, 2.8–5 cm. lata, nervis subtus elevatis 6–7-paribus intra margines inarcuantibus ; petioli graciles, rufo-hirti, 2.5–3 cm. longi. *Panicula* racemiformis, gracilis, hirta, ramis brevibus, 22 cm. longa, pedicellis 2 mm. longis. *Flos masculus* : *Calyx* tubulosus, hirtus, 1 cm. longus, 3 mm. latus, lobis linearibus 8 mm. longis hirtis angustissimis. *Androecii* stipes gracilis, antheris 5 minutis globosis subliberis. *Flos femineus* : *Ovarium* globosum, hirtum. *Styli* 2, recurvi, stigmatibus capitatis, gynophoro brevi glabro.

SUMATRA. East Coast, Asahan, Bandar Puluh, *H. S. Yates* 2142.

This has the tubular flowers of *S. gracilis* Korth., but the leaves are entirely different in shape and the whole plant is more or less hairy.

***Sterculia pallidiflora* Ridley**, sp. nov., a *S. gracili* Korth., cui affinis, calyce tubuloso glabro albo, lobis brevioribus latioribus differt.

Frutex glaber, panicula excepta. *Folia* lanceolata vel oblongo-lanceolata cuspidata, cuspidate 2 cm. longo acuto basi subacuto, chartacea, sicca pallida, 12–20 cm. longa, 4–10 cm. lata, nervis subtus elevatis, uno pare basali, 6 paribus e costa ortis ; petioli 3–7 cm. longi. *Panicula* rufo-hirta, 15 cm. longa, ramis 2 cm. longis. *Flores* albi. *Calyx* tubulosus, basin versus attenuatus, parce rufo-hirtus, 12 mm. longus, lobis linearibus obtusis 3 mm. longis, marginibus albo-hirtis. *Androecium* breve, stipite brevissimo conico, antheris minimis oblongis rectis.

SARAWAK. Forests on the slope of Mt. Matang, *Ridley* 12558 : “ Shrub, flowers white.”

This plant, of which I only found a single specimen, belongs to the group of *S. gracilis* Korth., the tube of the calyx being much longer than broad. The lobes are remarkably short in proportion and broader than usual.

***Sterculia campaniflora* Ridley**, sp. nov., a *S. gracili* Korth., cui affinis, foliis oblongis vel ellipticis majoribus, calycis tubo latiore obconico-tubuloso differt.

Frutex glaber. *Folia* oblonga vel elliptica, cuspidata, basi obtusa, 10–20 cm. longa, 6·8–7·5 mm. lata, chartacea, glabra, nervis utrinque elevatis tenuibus intra margines arcuatis 9–12-paribus, nervulis irregularibus anastomosantibus; petioli graciles, apice incrassati, 1 cm. longi. *Paniculae* laxae, graciles, 15 cm. longae, ramis dissitis 3 cm. longis, ramulis apicalibus 5 mm. longis parce puberulis. *Pedicelli* graciles, 3 ad 5 mm. longi. *Calyx* obconico-tubulosus, parce hirtus, 7 mm. longus, lobis linearibus aequilongis hirtis. *Androecium* breviter graciliter stipitatum, antheris 5 oblongis parvis in capitulo erecto dispositis.

SARAWAK. Baram, at Entoyut, *Hose* 450 (type).

BRUNEI. Limbang, *Haviland* 734.

DUTCH BORNEO. Banjermasin, *Motley* 948: "Shrub. Flowers whitish."

The tube of the calyx is longer than usual and in this it approaches *S. gracilis* Korth., but it is much wider and more obconic in outline. The inflorescence is usually a more spreading panicle and the leaves are elliptic-oblong.

***Sterculia cuspidella* Ridley**, sp. nov., a *S. rhynchophylla* K. Schum., cui affinis, foliis oblongis, basi late rotundata, cuspidate brevior, nervis paucioribus, floribus majoribus et glabrioribus differt.

Arbor, ramulis dense rufo-hirtis. *Folia* oblonga, cuspidata, basi rotundata, 6·5 cm. longa, 5·5 cm. lata, supra glabra, juniora subtus rufo-hirta, adulta costa excepta glabra, nervis 4-paribus tenuibus subtus elevatis intra margines arcuantibus, secundariis paucis, nervulis transversis paucis remotis, reticulationibus laxis; petioli graciles, apicibus incrassatis hirtis, 2·5 cm. longi. *Panicula* gracilis, pubescens, 11·5–18 cm. longa, ramis brevibus 1–1·5 cm. longis remotis paucifloris. *Pedicelli* graciles, pubescentes, 8 mm. longi. *Flores masculi*: *Calyx* cupuliformis, pubescens, 4 mm. longus, lobis linearibus hirtis 5 mm. longis. *Androecii* stipes gracilis, antheris 5 oblongis incurvis, capitulo decurvo. *Flores feminei* et *fructus* non visi.

SARAWAK. Near Kuching, *Haviland* & *Hose* 3404 (type); Baram, *Hose* 574; Miri, *Hose* 614.

***Sterculia borneënsis* Ridley**, sp. nov., a *S. javanica* Bl., cui affinis, foliis subtus pallide tomentosis nec hirtis, calycis lobis elongatis linearibus hirtis incurvis, floribus majoribus differt.

Arbor parva, ramulis rufo-pubescentibus. *Perulae* lanceolatae, acuminatae, rufo-hirtae. *Folia* ovato-oblonga, apice breviter acuta

vel rotundata, basi truncata vel subcordata, 14–21 cm. longa, 8.5–15 cm. lata, supra glabra, subtus pallide velutina, nervis 8-paribus subtus elevatis, nervulis transversis copiosis parallelis elevatis, reticulationibus obscuris; petioli apice incrassati, rufo-velutini, 5 cm. longi. *Panicula mascula* laxa, ramis 14 cm. longis dense velutino-hirtis, ramulis dissitis 2 cm. longis, pedicellis 7 mm. longis. *Calyx* obconicus, pubescens, lobis linearibus incurvis 4 mm. longis, margine longe albo-hirtis. *Androecium* stipite gracili praeditum, antheris 5 oblongis in capitulo decurvo. *Flores feminei* non visi. *Folliculi* oblongi, subignosi, 12 cm. longi. *Semina* oblonga, atra, 2 cm. longa, 1 cm. crassa.

SARAWAK. Near Kuching, small tree, *Haviland* 735.

This is allied to *S. macrophylla* Vent. and *S. javanica* Bl., but differs totally from both in the linear calyx-lobes incurved and long-hairy on the edges, and in the much larger fruit.

Tarrietia albiflora Ridley, sp. nov., a *T. Curtisii* King, cui affinis, foliolis tribus glabris, floribus majoribus differt.

Arbor magna, ramorum apicibus cum perulis rufo-hirtis. *Folia* triphylla, glabra; foliola subaequalia, lanceolato-elliptica, obtusa vel obtuse acuminata, basi attenuata, 8.5–10 cm. longa, 4 cm. lata, coriacea, nervis 8–10-paribus tenuibus subtus elevatis, petiolulis 1–1.5 cm. longis; petioli 7 cm. longi. *Paniculae* ex axillis summis ortae, multiflorae, pilis stellatis dense tectae, 12–13 cm. longae, ramis 1 cm. longis. *Pedicelli* molliter hirti, 3 mm. longi. *Flores masculi*: *Calyx* campanulatus, extra et intus dense molliter hirtus, albus, usque ad trientem lobatus, lobis 5 oblongis acutis. *Androecii* stipes gracilis, brevis, glaber, e pulvino hirtus exortus, antheris minutis 5 in capitulo. *Flores feminei*: *Carpella* 5, semi-ellipsoidea, ferme libera, superne hirta, stigmatibus brevibus recurvis, antheris abortivis ad basin 5.

SARAWAK. Near Kuching, *Haviland* 2262: "Large tree, flowers white, badly scented."

This tree is very distinct in its large flowers and trifoliolate leaves.

BUETTNERIACEAE.

Buettneria scabrida Ridley, sp. nov., a *B. angulata* Hassk., cui affinis, floribus pluribus dense paniculatis, petalis multo brevioribus et cum ramis scabridis, processibus pubescentibus differt.

Frutex scandens, scabridus, processibus pubescentibus tectus. *Folia* ovato-rotundata, cordata, cuspidata, cuspidate obtusa 1 cm. longa, 9–13 cm. longa, 8–13 cm. lata, chartacea, nervis 10-paribus subtus in axillis fasciculis pilorum instructis elevatis subscabridis, nervulis transversis copiosis parallelis; petioli scabridi, 6–7 cm. longi. *Panicula* axillaris, valde scabrida, densa, multiflora, 6–11 cm. longa, ramulis velutinis. *Pedicelli* 1 mm. longi, velutini. *Flores* 2 mm. longi, alabastris conicis. *Sepala* 4, triangularia, extra et intus pubescentia. *Petala* 5, basi oblongo-truncata, superne spathulato-

lanceolata. *Stamina* 5, minutissima. *Ovarium* subrotundum, glabrum. *Stylus* brevis, stigmatē bilobo. *Capsula* globosa, 2 cm. diametro, processibus conicis acutis 3 mm. longis tecta.

SARAWAK. Rejang, Sibuan, *Haviland* 2831, 2866 (type).

This much resembles *B. angulata* Hassk., of Java, but differs in the more numerous flowers, shorter petals and smaller fruit with conic thorn-like not acicular armature. The scabridity of the stem and petals is peculiar, consisting of innumerable short cylindric, blunt, pubescent processes.

TILIACEAE.

Brownlowia glabrata Stapf mss., descr. Ridley, sp. nov., a *B. Havilandii* Stapf, cui affinis, floribus majoribus, foliis haud peltatis squamatis differt.

Arbor parva, ramis glabris. *Folia* ovato-lanceolata vel ovato-oblonga, obtusa, basi rotundata subtruncata, coriacea, supra squamis denticulatis subtus squamis argenteis integris undique tecta, 11–20 cm. longa, 8–10.5 cm. lata, nervis subtus elevatis, basalibus 2-paribus, lateralibus e costa ortis 3-paribus, nervulis transversis parallelis undulatis reticulationibus parvis; petioli 6–9 cm. longi, apicibus incrassatis, squamati. *Panicula* laxa, elongata, 30 cm. longa, ramis squamatis 15 cm. longis, ramulis paucis remotis 5 cm. longis. *Flores* subumbellati, pedicellis squamatis 5 mm. longis. *Calyx* urceolatus, lobis 5 triangularibus acutis squamatis, 6 mm. longus. *Petala* alba, oblanceolata, integra, obtusa, 1 cm. longa, 4 mm. lata. *Stamina* multa, 7 mm. longa. *Ovarium* subglobosum, hirtum. *Stylus* elongatus, superne attenuatus.

SARAWAK. Mt. Buan, limestone, *Haviland* 1996 (type) and near Busau, *Haviland* " = 1996 " : " Small tree, petals white."

This beautiful large-flowered species resembles *B. Havilandii* Stapf, but the flowers are bigger and the leaves not peltate.

I have retained Stapf's ms. name for this plant, though it is hardly glabrous, being densely covered with silvery scales except on the upper side of the young leaves which bear numerous star-shaped scale-like bodies with many processes.

Brownlowia riparia Ridley, sp. nov., a *B. elata* Roxb., cui affinis, foliis lanceolato-ovatis, floribus minoribus in paniculis brevibus densis e ligno vetustiore ortis, calyce brevi lato basi truncato differt.

Arbor glabra. *Folia* lanceolato-ovata, cordata, acuminata, 15–21 cm. longa, 6–13 cm. lata, coriacea, glabra, esquamata, subtus pallida, nervis basalibus 4-paribus, lateralibus e costa ortis 4-paribus subtus elevatis, nervulis transversis parallelis saepe flexuosis 1 cm. distantibus; petioli apicibus incrassati, 9.5 cm. longi. *Paniculae* e ramis vetustioribus ortae, 9 cm. longae, densae, multiflorae. *Calyx* urceolatus, brevis, puberulus, basi truncatus, lobis 5 acutis. *Petala* lineari-oblonga, obtusa. *Stamina* copiosa, stylo breviora. *Staminodia* linearia, acuminata. *Ovarium* puberulum, globosum, 5-lobum. *Stylus* longus, basi crassus, superne attenuatus.

SARAWAK. Near Kuching, tidal river bank, *Haviland* 1674.

Perhaps as near *B. elata* Roxb., of Chittagong, as any species, but the leaves are more lanceolate, the flowers smaller and the calyx short, broad and flat at the base, and the panicles borne on the old wood.

Brownlowia elliptica Ridley, sp. nov., a *B. tabulari* Pierre, cui affinis, foliis ellipticis, nervis paucioribus supra depressis subtus elevatis, nervulis transversis paucis conspicuis, panicula longiore gracili differt.

Arbor glabra. *Folia* elliptico-lanceolata, basi acuminata, obtusa, coriacea, glabra, superne polita, 14–20 cm. longa, 5.5–10 cm. lata, nervis subtus elevatis, basalibus 1-paribus, lateralibus e costa ortis 4-paribus curvis, nervulis transversis paucis 5 mm.–1 cm. distantibus parallelis subtus elevatis supra depressis; petioli 2–5 cm. longi, superne incrassati. *Panicula* elongata, laxa, valida, furfuraceo-squamosa, 30 cm. longa. *Flores* 2–3 in ramis brevibus oppositis 2 mm. longis. *Pedicelli* 2 mm. longi, squamosi. *Calyx* campanulatus, lobis 5 brevibus acutis, 4 mm. longus, squamatus. *Petala* oblonga, basi paullo angustata, obtusa. *Stamina* copiosa, dimidio petalorum aequilonga. *Ovarii* carpidia 5, ovoidea vel elliptica, hirta, sublibera. *Stylus* elongatus, petalis brevior, apice decurvedus, stigmatibus minuto.

SARAWAK. Baram, *Haviland & Hose* 3739: "Single specimen."

This plant differs from all known species in the large elliptic leaves narrowed to the base with strongly elevated nerves. The carpels of the ovary are so slightly attached together that they separate at a touch. It seems to be most closely allied to *B. tabularis* Pierre, of Annam.

Brownlowia Riedelii Hemsl.

SARAWAK. Tidal river bank, *Haviland* 1640.

A new record for Borneo.

Pentace cordifolia Ridley, sp. nov., a *P. Curtisii* King, cui affinis, foliis cordatis, nervis pluribus, calyce campanulato lobis brevioribus differt.

Arbor, ramis juvenilibus furfuraceis. *Folia* elliptica, cordata, obtusa vel apice rotundata, coriacea, subtus pallida, 12–14 cm. longa, 6.6–8.4 cm. lata, nervis basalibus 3-paribus, lateralibus e costa ortis 3-paribus subtus elevatis, nervulis transversis parallelis 5 mm. distantibus elevatis, reticulationibus laxis; petioli 3.5 cm. longi, apice incrassati. *Panicula* terminalis, laxa, validula, 28 cm. longa, ramis 7–10 cm. longis crassiusculis furfuraceis. *Flores* 1–3 in ramulis 5 mm. longis. *Pedicelli* 4 mm. longi. *Calyx* campanulatus, lobis 5 triangularibus acutis brevibus furfuraceis 3 mm. latis. *Petala* longiora, oblonga, abrupte unguiculata, apicibus rotundatis glabris. *Stamina* breviora, copiosa. *Staminodia* pauca. *Ovarium* conicum, 5-costatum, hirtum. *Stylus* superne glaber, petalis brevior.

SARAWAK. Rejang, Sibü, *Haviland* 3403.

This is somewhat like *P. Curtisii* King, of the Malay Peninsula, but the leaves are cordate and the calyx much more shortly cleft.

Microcos Havilandii Ridley, sp. nov., a *M. latistipulata* Ridley, cui affinis, foliis tenuioribus, paniculis axillaribus laxioribus, floribus paucioribus, sepalis oblongis differt.

Arbor paniculis exceptis glaberrima. *Folia* elliptica, cuspidata, basi breviter attenuata, subcoriacea, 19–24 cm. longa, 8–10 cm. lata, nervis 5-paribus subtus elevatis, nervulis transversis subparallelis paucis, reticulationibus conspicuis; petioli 2.5 cm. longi. *Paniculae* axillares, furfuraceae, pauciflorae, 4–8 cm. longae, umbellis 2–3-floris. *Pedicelli* 2 mm. longi, puberuli. *Sepala* 5, oblonga, obtusa, velutina, 6 mm. longa, 3 mm. lata. *Petala* 5, subspathulato-lanceolata, acuta, glabra. *Stamina* 20, filamentis filiformibus glabris. *Androgynophorus* apice albo-hirtus. *Ovarium* globosum, glabrum. *Stylus* longus, gracilis.

SARAWAK. Rejang, Kapit, *Haviland* 2332.

Distinctly allied to *M. latistipulata* Ridley, of the Malay Peninsula and Sumatra, but the leaves are thinner and the few-flowered panicles laxer, also the sepals are oblong. There is no trace of the characteristic stipules of the allied plant.

Microcos laurifolia Burret.

SARAWAK. Sine loc. exact., *Beccari* 3473.

New record for Borneo. The specimen differs somewhat from the Penang plant in the thinner lanceolate leaves drawn out to a long point, and in the rather large flowers, but I do not think it can be separated specifically.

Microcos subepetala Stapf mss., descr. Ridley, sp. nov., a *M. anti-desmifolia* Burret, cui affinis, foliis minoribus ovatis, floribus pluribus minoribus, petalis minutis sericeis distincta.

Arbor subglabra, ramorum cortice pallido. *Folia* elliptico-ovata, obtusa, basi subacuta, subcoriacea, glabra, 8–8.5 cm. longa, 4–4.5 cm. lata, costa nervisque 4-paribus subtus parce hirtis; petioli 8 mm. –1 cm. longi, pubescentes. *Paniculae* terminales et ex axillis summis, numerosae, multiflorae, pilis stellatis pubescentes, 4–5 cm. longae. *Bractaeae* bilobae, lobis oblongis obtusis, tomentosae. *Flores* 3–4 in umbellulis dispositi. *Pedicelli* tomentosi, 1–2 mm. longi. *Sepala* 5 vel 6, oblonga, obtusa, cucullata, 3 mm. longa, extra tomentosa. *Petala* 5, minima, spathulata, hirta. *Stamina* 30, 2 mm. longa, filamentis filiformibus. *Androgynophorus* brevis, apice hirtus. *Ovarium* globosum, glabrum. *Stylus* crassiusculus, acuminatus, staminibus brevior, stigmatibus minuto.

SARAWAK. Kuching, *Haviland* 1885.

A very distinct plant in its small nearly ovate leaves and dense clusters of panicles of small flowers. The petals are very small and silky haired, about half as long as the ovary.

Microcos gracilis *Stapf* mss., descr. *Ridley*, sp. nov., a *M. hirsuta* Burret, cui affinis, foliis multo minoribus lanceolatis longe acuminate, floribus minoribus differt.

Arbor parva, ramis gracilibus pilis stellatis tomentosis. *Folia* lanceolata, acuminata, basi rotundata, chartacea, supra glabra, subtus pilis stellatis tecta, 5.2–10 cm. longa, 2.7–4 cm. lata, costa nervisque 5–6-paribus subtus elevatis dense tomentosis intra margines inarquantibus; petioli tomentosi, 2 mm. longi. *Panicula* terminalis, tomentosa, pauciflora, 2–4 cm. longa. *Pedicelli* tomentosi, 4 mm. longi. *Bractee* angustissime lineares, acuminatae, bifidae, tomentosae. *Sepala* 5, oblonga, obtusa, 4 mm. longa, dense tomentosa. *Petala* 5, breviora, oblonga, obtusa, glabra. *Stamina* 20, filamentis linearibus brevibus glabris, antheris subglobosis loculis disjunctis. *Ovarium* subglobosum, hirtum. *Stylus* filiformis, glaber, stamina superans. *Drupae* pyriformes vel globosae, pubescentes, flavae, 1.5 cm. diametro.

SARAWAK. Kuching, *Bartlett*; *ibid.*, small tree, calyx green, petals yellow, berry yellow, *Haviland* 1509 (type), 1683, 1742.

Perhaps nearest to *M. hirsuta* Burret, but with very slender branches and very much smaller long acuminate leaves.

Grewia umbellata *Roxb.*

SARAWAK. *Beccari* 806, 1090. Busau, *Ridley* 12386.

DUTCH BORNEO. Banjermasin. *Motley* 1165.

Grewia glabra *Bl.*

DUTCH BORNEO. Banjermasin, small tree, *Motley* 240.

Triumfetta pseudo-cana *Sprague.*

SARAWAK. Lundu, *Ridley* 12379.

Corchorus acutangulus *Lam.*

DUTCH BORNEO. Banjermasin, *Motley* 366.

Sloanea javanica *Bl.*

BRIT. N. BORNEO. Tawao, Elphinstone Province, *Elmer* 21791.

ELAEocarpaceae.

Elaeocarpus polystachyus *Wall.* var. **borneënsis** *Ridley*, var. nov., foliis basi angustatis, subtus omnino breviter hirtis, petioliis lanuginosis, sepalis et petalis 5 nec 4, distincta.

BRIT. N. BORNEO. East Coast, *Creagh* (type); Sandakan, Myburgh Province, *Elmer* 20280.

This plant is much more woolly-tomentose than the typical form of the Malay Peninsula; the leaves are hairy all over beneath instead of being nearly glabrous, and the petioles also are tomentose. The flowers are slightly smaller and have 5 instead of 4 petals and sepals. Still, I follow Brandis and Merrill in keeping it as a form of the common Malayan plant.

Elaeocarpus ochraceus Stapf mss., descr. Ridley, sp. nov., ab *E. polystachyo* Wall., cui affinis, floribus multo minoribus pubescentibus, staminibus 12–15 differt.

Arbor parva, ramis hirtulis. *Folia* lanceolata vel ovato-lanceolata, integra, cuspidata, cuspidē 1.5 cm. longa, basi rotundata vel obtusa, 10–12.5 cm. longa, 4–6 cm. lata, tenuiter coriacea, nervis 8–10-paribus subtus elevatis hirtulis, nervulis transversis copiosis; petioli pubescentes. *Racemi* subterminales, erecti, multiflori, pubescentes, 9 cm. longi. *Flores* parvi, nutantes, pallide flavi; alabastra globosa. *Pedicelli* 2 mm. longi, pubescentes. *Sepala* 5, lanceolata, 3 mm. longa, extra et intus pubescentia. *Petala* 5, lanceolata, integra, pubescentia. *Stamina* 12–15, brevia, antheris clavatis pubescentibus. *Discus* obscurus, hirtus. *Ovarium* trilobulare, subglobosum, hirtum. *Stylus* brevis, glaber.

SARAWAK. Penkulu Ampat, young jungle, dioecious, *Haviland* 33 (b.s.k.a.) (type); near Kuching, small tree, flowers pale yellow, *Haviland* 2230 (" = 49").

Allied to *E. polystachyus* Wall., but with smaller less densely velvety sepals, and only 12–15 stamens.

Elaeocarpus polyanthus Ridley, sp. nov., ab *E. polystachyo* Wall., cui affinis, foliis oblanceolatis acuminatis, nervis rufo-hirtis, floribus multo majoribus, rhachidibus rufo-tomentosis multo crassioribus, sepalis petalisque 5 differt.

Arbor 15-metralis. *Folia* oblanceolata, abrupte acute acuminata, basi cuneata, supra glabra, subtus sparse hirta, 16–18 cm. longa, 6–7 cm. lata, costa elevata dense rufo-tomentosa, nervis 12-paribus rufo-tomentosis, reticulationibus elevatis conspicuis; petioli 3.5 cm. longi, tomentosi, apice geniculati. *Racemi* subterminales, erecti, validi, multiflori, tomentosi, 18 cm. longi. *Bractee* oblongae, tomentosae, 2 mm. longae. *Pedicelli* validi, tomentosi, 1 cm. longi. *Alabastra* globosa, tomentosa. *Sepala* 5, lanceolata, obtusa, dense tomentosa, 5 mm. longa, 2 mm. lata. *Petala* 5, lanceolata, obtusa, tomentosa, integra, intus albo-sericea, carinata, 5 mm. longa. *Stamina* circiter 30, glabra, antheris lineari-oblongis, filamentis aequilongis. *Discus* patelliformis, obscure lobatus. *Ovarium* appresse hirtum, ovoideum.

SARAWAK. Hill, 12th mile on Penrissen road, Kuching, 4 Jan. 1924, *Omar* 352. "Tree. Height about 45 feet. Girth, breast high, 3 feet. Bark $\frac{1}{2}$ inch thick. Wood light, used for firewood, planks, light construction." Native name: *Sanga Bukit*.

This fine tree is remarkable for its red-hairy leaf nerves and inflorescence, and its very large flowers for its affinity and more numerous stamens.

Elaeocarpus polycarpus Stapf mss., descr. Ridley, sp. nov., ab *E. polystachyo* Wall., cui affinis, foliis ellipticis subobtusis subtus tomentosis, petiolis tomentosis, racemis densioribus tomentosis, petalis sepalisque 5 nec 4, staminibus 50–60 differt.

Arbor parva, ramis lanuginosis. *Folia* elliptica, integra, breviter obtuse cuspidata, basi rotundata, coriacea, supra glabra laevia costa excepta, subtus hirta, 16–23 cm. longa, 8–16 cm. lata, nervis subtus elevatis 13-paribus tomentosis, nervulis parallelis elevatis; petioli 6–7 cm. longi, lanuginosi. *Racemi* subterminales, multiflori, lanuginosi, 15 cm. longi. *Bractae* angustae, lanceolato-lineares, hirtae, 4 mm. longae. *Pedicelli* hirti, 7 mm. longi. *Flores* nutantes, parvi. *Sepala* 5, lanceolato-ovata, obtusa, 4 mm. longa. *Petala* 5, vix longiora, lanceolata, integra, hirta. *Stamina* 50–60, glabra, ovario multo breviora, antheris obtusis. *Discus* patelliformis, vix lobatus. *Ovarium* globosum, hirtum, 3- (rarius 2-) loculare. *Drupae* oblongae, obtusae, 1.6 cm. longae, 1 cm. diametro.

SARAWAK. Sine loc. exact., *Beccari* 2698; Kuching, *Haviland* 908 (type), 1637.

This is allied to *E. polystachyus* Wall., but the foliage is quite different and the whole plant much more tomentose. The leaf buds are covered with resin as in *E. paniculatus* Wall., not with pubescence. Dr. Haviland's specimens 1637 are all malformed, the inflorescence being condensed and paniced, and the flowers in umbels on long peduncles.

***Elaeocarpus insignis* Ridley**, sp. nov., ab *E. rugoso* Roxb., cui affinis, ramis, costa, racemis tomentosis vel pubescentibus, foliis spinuloso-serratis laminis fere ad bases petiolorum decurrentibus differt.

Arbor, ramis crassis superne olivaceo-tomentosis. *Folia* oblanceolata, fere ad bases petiolorum decurrentia, apice obtusa, marginibus spinuloso-serratis, supra glabra, subtus hirta, 17 cm. longa, 6 cm. lata, costa et nervis elevatis 3-paribus subtus hirtis, reticulationibus conspicuis; petioli crassi, hirti, 1.5 cm. longi. *Racemi* 10 cm. longi, hirti, floribus dissitis. *Bractae* obovatae, foliaceae, denticulatae, hirtae, 9 mm. longae, 4 mm. latae. *Pedicelli* graciles, 1.8 cm. longi, pubescentes. *Sepala* angusta, lanceolato-lineararia, pubescentia, 8 mm. longa. *Petala* delapsa, non visa. *Stamina* circiter 10, filamentis gracilibus glabris, antheris teretibus haud aristatis puberulis 5 mm. longis. *Discus* sinuatus, albo-sericeus. *Ovarium* conicum, dense breviter hirtum. *Stylus* longus, glaber.

SARAWAK. Sine loc. exact., *Beccari* 3194.

This remarkable species is allied to *E. rugosus* Roxb. and *E. monocera* Cav., from which it differs in the leaves being serrate and decurrent on the petiole nearly to the base, in the midrib tomentose on both sides in the young leaf, and in the hairy underside of the leaf and the raceme and tomentose shoots.

***Elaeocarpus crassifolius* Ridley**, sp. nov., ab *E. Beccarii* DC., cui affinis, foliis majoribus ovatis rigidis, floribus majoribus hirtis, sepalis crassioribus latioribus, disco haud lobato, differt.

Arbor parva, ramis crassis glabris. *Folia* ovata, acuta, basi rotundata, rigide coriacea, glabra, 14–15 cm. longa, 10–15 cm. lata, nervis subtus elevatis 6-paribus, reticulationibus conspicuis minute glanduloso-punctatis; petioli validi, 8–13 cm. longi, apice incrassati. *Racemi* axillares, hirti, 14-flori, 7 cm. longi. *Bracteae* lanceolatae, hirtae, 3 mm. longae. *Pedicelli* hirti, 1 cm. longi. *Sepala* 5, triangulari-lanceolata, acuminata, extra hirta, intus glabra, carinata, 5 mm. longa. *Petala* oblonga, glabra, valde laciniata, breviora. *Stamina* circiter 12, antheris cylindricis minute pustulatis, ciliis apicalibus 2–3. *Discus* crassus, hirtus, margine undulato. *Ovarium* globosum, dense rufo-hirtum. *Stylus* basi incrassatus, hirtus, superne attenuatus, glaber.

SARAWAK. Mt. Bongo, near Tegora, small tree, *Haviland* 2051.

This striking tree is clearly allied to *E. Beccarii* A. DC., but differs in the large ovate stiffly coriaceous leaves with long petioles, and in the fewer and much larger flowers. Except for the inflorescence and leaf-buds it is quite glabrous.

Elaeocarpus luridus Stapf mss., descr. Ridley, sp. nov., ab *E. Winkleri* Merrill, cui affinis, foliis ellipticis basi attenuatis subcoriaceis, staminibus 8, petalis subintegris differt.

Arbor, ramis crassiusculis dense hirtis. *Folia* elliptica, obtuse acuminata vel obtusa, basi attenuata, tenuiter coriacea, marginibus obscure crenatis, glabra (nervis juniorum exceptis), 11–13 cm. longa, 3–4.5 cm. lata, nervis 7-paribus subtus elevatis ascendentibus; petioli apice incrassati, 5 cm. longi. *Racemi* in axillis summis erecti, multiflori, sericeo-pubescentes, 8 cm. longi. *Pedicelli* hirti, 4 mm. longi. *Sepala* 4, lanceolata, hirta, 3 mm. longa. *Petala* oblonga, basi angustata, pubescentia, apicibus truncatis, laciniis paucis brevibus. *Stamina* 8, filamentis brevibus hirtis, antheris longis glabris cylindricis. *Discus* patelliformis, margine sinuatus, hirtus. *Ovarium* biloculare.

SARAWAK. Sine loc. exact., *Beccari* 3187.

The leaves of this plant dry reddish-brown beneath and fuscous above, hence I suppose Stapf's ms. name. All the flowers I have examined were males only with no trace of an ovary, but Stapf's note on the sheet gives the ovary as bilocular.

Elaeocarpus lasionyx Stapf mss., descr. Ridley, sp. nov., ab *E. angustifolio* Bl., cui affinis, ramis pubescentibus, foliis brevipetiolatis approximatis, petalis basi hirtis, antheris pubescentibus differt.

Arbor parva, ramis gracilibus pubescentibus. *Folia* lanceolata, basi obtusa, apice acuminato obtuso, tenuiter coriacea, utraque pagina sparse hirta, 6–6.5 cm. longa, 2 cm. lata, nervis 7-paribus subtus elevatis cum costa pubescentibus; petioli hirti, 2 mm. longi. *Racemi* axillares, graciles, 5 cm. longi, rhachide tomentosa. *Flores* circiter 10. *Pedicelli* tomentosi, 2 mm. longi. *Sepala* 5, lanceolata, acuminata, sparse pubescentia, marginibus densius albo-tomentosis,

4 mm. longa, 1 mm. lata. *Petala* 5, obcuneata, laciniis multis, basi longe pilosa, sepalis paullo breviora. *Stamina* 16, antheris pubescentibus apicibus ciliatis. *Ovarium* triloculare, hirtum. *Discus* vix lobatus, margine sinuata, carnosus, hirtus.

SARAWAK. Paku, Saribas, tidal river bank, small tree, *Haviland* 1555.

This is allied to *E. angustifolius* Bl., of Java, but has very close-set short-petioled leaves on slender hairy branches, the petals long hairy at the base and the anthers pubescent.

Elaeocarpus sphaeroblastus Stapf MSS., descr. Ridley, sp. nov., ab *E. Teysmanni* Koord. et Val., cui affinis, foliis glabris integris, floribus omnino glabris differt.

Arbor glabra. *Folia* lanceolata, basi angustata, apicibus deficientibus, chartacea, glabra, 10–13 cm. longa, 3.5–4 cm. lata, nervis gracilibus subtus elevatis 7-paribus; petioli 1–2 cm. longi. *Racemi* axillares, ex axillis foliorum delapsorum, patentes, glabri vel puberuli, 5.7 cm. longi. *Flores* dissiti, circiter 20, alabastro ovoideo-globosi. *Pedicelli* 3 mm. longi. *Sepala* 5, ovata, glabra, 3 mm. longa. *Petala* 5, breviora, glabra, obcuneata, laciniis paucis longis. *Stamina* 35, antheris brevibus cylindricis glabris, filamentis subaequilongis. *Ovarium* parvum, ovoideum, triloculare. *Discus* glaber, lobis rotundatis 5.

SARAWAK. Saribas, *Haviland* 1556.

Except for a little puberulousness on the leaf-buds, rhachis and pedicels when young, this tree appears to be quite glabrous. The small globose buds and short broadly ovate sepals are characteristic.

Elaeocarpus stipularis Bl. and ***E. tomentosus*** Bl., Bijdr. 121 (1825).

These two species were described together by Blume but are now known to be mere forms of the same tree, which is very common in the lowland woods of the Malay Peninsula and Borneo extending to Siam, Sumatra and Java. It is not really very variable though herbarium specimens often appear to differ in size of leaves, length of petiole, etc., whence it has received a number of specific and varietal names.

The typical form, *E. stipularis* Bl., has nearly entire stipules, small narrow lanceolate leaves, narrowed to the base, glabrous except for some hair on the midrib and nerves beneath. This appears to be confined to Java (Ngdisari and Chiboddas).

E. tomentosus Bl. has deeply lobed stipules with several teeth, and ovate leaves, thickly hairy especially beneath. This form is the common tree of the Malay Peninsula and Borneo, rather scarce in Java (Mt. Prah, Arjuno and Chibboddas, Gedeh, Tengger, Bantam, *Forbes* 525) and is the plant known as *E. stipularis* Bl. in Hook. fil. Fl. Brit. Ind. 1, 404 (1874), King in Journ. As. Soc. Beng. 60 (2), 123 (1891), Ridley, Fl. Mal. Pen. 1, 311 (1922), and is also *E. Gambir* Becc. Nelle Foreste di Borneo, 594 (1902), *E. brevipes* Merr. in

Journ. As. Soc. Straits Br. **86**, 327 (1922), *E. Scortechinii* King, l.c. 124. The last two species are based on broad-leaved specimens and Merrill's plant has short petioles. The variation in the number of loculi in the ovary and in the form of the fruit has been pointed out already by me in the Fl. Mal. Pen. l.c.

Elaeocarpus Hullettii King.

SARAWAK. *Beccari* 3130, 3498; near Kuching, shrub, *Haviland* 1619, 1619B.

New record.

Elaeocarpus parvifolius Wall.

SARAWAK. *Beccari* 1026, 3707; Matang, *Haviland* c.l.r.b., 1044, *Ridley* 12293.

BRUNEI. Limbang, *Haviland* 506.

BRIT. N. BORNEO. *Lowe*.

New record. The Bornean form is rather more pubescent than the Malay Peninsula plant.

Elaeocarpus euneurus Stapf MSS., nom. nov. *E. Beccarii* Warb. in Fedde, Repert. **18**, 328 (1922), non A.DC. (1903).

SARAWAK. *Beccari* 3093; near Kuching, *Haviland* 2126, 2129: "sepals 4, petals 4, stamens 8, ovary cells 2."

Elaeocarpus glaber Bl.

SARAWAK. *Beccari* 1197; Matang, Sarawak river, *Haviland* b.z.d.a.

DUTCH BORNEO. Banjarmasin, *Motley* 194: "cultivated, common; flowers white; fruit ovoid, diameter 5 lines, deep blue, eatable."

Elaeocarpus microphyllus Warb. in Fedde, Repert. **18**, 338 (1922), based on *Beccari* 3224, is I think only a mountain form of **E. Mastersii** King. An exactly similar form occurs on Mt. Ophir (*Griffith* 680), and other forms connect it with typical lowland *E. Mastersii*, e.g. on the top of Mt. Matang, Serapi, *Ridley* 12267; on Mt. Murud, *Moulton* 186; Gunong Klam, *Hallier* 2475.

Elaeocarpus Jackianus Wall.

SARAWAK. *Beccari* 3490.

This common Malayan plant does not seem to have been recorded for Borneo before.

CHAILLETIACEAE

(see also K.B. 1930, 372).

Dichapetalum tetramerum *Ridley*, sp. nov., a *D. Griffithii* Engl., cui affinis, floribus tetrameris, ramis nervisque molliter rufescenti-hirtis, petalis integris differt.

Frutex, ramis dense rufescenti-hirtis. *Folia* lanceolato-oblonga, acuminata, obtusa, basibus cuneatis, subcoriacea, supra laevia,

nervis depressis, 15 cm. longa, 4-5 cm. lata, nervis 6-paribus subtus elevatis inter se arcuantibus rufescenti-hirtis, nervulis et reticulationibus elevatis hirtis; petioli apice incrassati, dense hirti, 8 mm. longi. *Flores* 10-14, in axillis congesti, pedicellis 1 mm. longis vel subnullis. *Sepala* 4, linearia, obtusa, dense hirta, 2 mm. longa. *Petala* 4, linearia, obtusa, integra, extra dense hirta, 3 mm. longa. *Stamina* 4, filamentis linearibus hirsutis pistillo multo brevioribus, antherarum loculis connectivo latiusculo dissitis. *Ovarium* ovoideum, dense hirtum. *Stylus* brevis, crassus, stigmatibus breviter trilobis.

SARAWAK. Matang woods, *Ridley* 12554.

This differs from any other species known to me in having tetramerous flowers. The style is so short and the ovarian hairs so long that all but the stigma is quite concealed. The petals in bud are quite entire.

CELASTRACEAE

(see also K.B. 1931, 36).

Kurrimia minor *Ridley*, sp. nov., a *K. pulcherrima* Wall., cui affinis, foliis multo minoribus, paniculis brevioribus laxioribus, staminibus minoribus, floribus flavescentibus differt.

Arbor magna. *Folia* elliptica vel oblanceolata, obtusa, basibus angustatis, coriacea, glabra, 8-13 cm. longa, 4-5 cm. lata, nervis 8-16-paribus subtus elevatis, nervulis transversis parallelis copiosissimis; petioli 3 cm. longi, apicibus dilatatis. *Paniculae* laxae, patentes, pubescentes, 15 cm. longae, ramis dissitis. *Flores* pallide flavi vel virescentes, 3 mm. lati, pedicellis 2 mm. longis pubescentibus. *Sepala* 5, oblongo-ovata, apicibus rotundatis. *Petala* 5, oblonga, obtusa, glabra. *Stamina* 5, filamentis ovario aequilongis. *Pistillum* subglobosum, infra stigma albo-pilosum. *Disci* lobi 5, petalis oppositi. *Ovarium* biloculare, loculis biovulatis, ovulis erectis. *Capsula* fusiformis, 3 cm. longa.

SARAWAK. *Beccari*, 2624 (fruiting specimen). Kuching, large tree, flowers pale yellow, *Haviland* 644, 1788 (type), 2139. Buntal, *Haviland* 1843.

This differs from *K. pulcherrima* Wall. in the shorter panicles with more scattered pedicellate yellow flowers. The leaves also have more nerves and distinct and numerous transverse nervules.

Kurrimia paniculata *Wall.*

DUTCH BORNEO. *Teysmann* 10876.

SARAWAK. *Beccari* 2974. Rock Road, 2nd Mile, Kuching, *Haviland* 644.

Not previously recorded from Borneo.

Solenospermum apiculatum *Ridley*, sp. nov., a *S. littorali* (Laws.) Loes., cui affinis, foliis coriaceis integris obovatis vel ellipticis apicibus rotundatis differt.

Arbor glabra. *Folia* coriacea, obovata vel elliptica, apicibus rotundatis minute apiculatis, basibus cuneatis, marginibus integris,

5.5-9 cm. longa, 4-4.6 cm. lata, nervis 4-paribus obscuris ; petioli crassi, 1 cm. longi. *Panicula* subterminalis, laxa, 10 cm. longa, pedicellis 4 mm. longis. *Sepala* ovata, obtusa, brevia. *Petala* ovata, subacuta, 2 mm. longa, supra carinata. *Stamina* 5, inclusa, filamentis linearibus. *Discus* pulviniformis, 2 mm. latus. *Capsula* oblongo-lanceolata, 7.3 cm. longa, valvis extra nigro-pustulatis intus laevibus politis castaneis. *Semina* alis oblongis instructa, 5.5 cm. longa, 1.5 cm. lata.

SARAWAK. *Beccari* 2639, 2893 (type).

Allied to *S. littorale* (Laws.) Loes. (*Kokoona littoralis* Laws.), but differing in the more coriaceous leaves, blunt except for a minute point, and with quite entire margins. The fruit resembles that of *S. littorale* but is not stalked as in that species.

***Solenospermum aquatile* Ridley**, sp. nov., a *S. littorali* (Laws.) Loes., cui affinis, foliis latis ellipticis apicibus rotundatis marginibus integris, nervis 8-paribus, floribus parvis in cymis dispositis, capsula minore lanceolata utrinque acuta differt.

Arbor elata, cortice nigro. *Folia* subcoriacea, elliptico-ovata, apicibus rotundatis, basibus cuneatis, marginibus undulatis, 8-9 cm. longa, 5-5.5 cm. lata, nervis 8-paribus inconspicuis ; petioli 1.8 cm. longi. *Cyma* brevis, axillaris, pedunculo 2.5 cm. longo, ramis 3 patentibus 1 cm. longis, pedicellis 2 mm. longis. *Flores* parvi, 5 mm. lati. *Sepala* brevia, rotundata. *Petala* triangularia, subacuta, supra carinata. *Staminum* filamenta longiuscula, antheris ellipticis. *Capsula* lanceolata, acuminata, basi et apice angustata, 4.5 cm. longa.

DUTCH BORNEO. Banjarmasin, *Motley* 861 : " A tall tree, always growing in the water, rarely more than a foot in diameter but tall and straight with few branches. Wood white with reddish veins, soft and easily worked, decaying wonderfully fast in the weather but durable when kept dry."

Allied to *S. littorale* (Laws.) Loes., but the leaves much broader, elliptic, blunt, with eight pairs of nerves, the panicles reduced to cymes of small flowers. The fruit is lanceolate in outline, pointed at both ends and not stalked.

***Kokoona ovato-lanceolata* Ridley**, sp. nov., a *K. Scortechinii* King, cui affinis, foliis ovato-lanceolatis minoribus, floribus minoribus, antherarum appendicibus brevioribus haud pustulatis differt.

Arbor glabra. *Folia* subopposita, ovato-lanceolata, acuminata, basibus rotundatis vel subacutis, tenuiter coriacea, marginibus incrassatis, 9.5 cm. longa, 4.5 cm. lata, nervis tenuibus inconspicuis 7-paribus, reticulationibus aequae conspicuis ; petioli 5 mm. longi. *Panicula* elongata, gracilis, 13 cm. longa, pauciramosa, ramis brevibus 1.5 cm. longis vel brevioribus. *Flores* parvi. *Calyx* patelliformis, lobis 5 rotundatis. *Petala* 5, rotundato-ovata, obtusa. *Stamina* 5, filamentis brevibus e basi latiore, antheris longioribus

conicis appendiculatis haud pustulatis. *Stylus* cylindricus, stigmate capitato. *Ovula* plurima.

SARAWAK. *Beccari* 3471.

Kokoona lanceolata Ridley, sp. nov., a *K. coriacea* King, cui affinis, foliis lanceolatis angustioribus, antheris appendiculatis pustulatis differt.

Arbor glabra. *Folia* alterna, coriacea, elliptica vel lanceolata, acuminata, basi angustata, 6–14 cm. longa, 2.5–4.5 cm. lata, nervis tenuibus 5-paribus intra marginem inarcuantibus; petioli 1–1.5 cm. longi. *Racemi* vel *paniculae* axillares, 6–9 cm. longi, pedicellis 5 mm. longis. *Bracteae* ovatae, minutae. *Sepala* 5, rotundata. *Petala* 5, coriacea, oblonga, acuta, 3 mm. longa. *Discus* margine elevatus, sinuatus. *Stamina* 5, filamentis e disco ortis triangularibus acuminatis, antheris majoribus oblongis, appendicibus longiusculis pustulatis. *Ovarium* triloculare. *Stigma* cylindricum.

SARAWAK. *Beccari* 2567.

This plant is undoubtedly allied to *Kokoona coriacea* King but differs entirely in the narrow lanceolate leaves and the pustulate anther appendages. This group of the genus is extremely non-typical in the large anthers with distinct appendages.

Salacia megasperma Ridley, sp. nov., a *S. latifolia* Wall., cui affinis, foliis oblongis cuspidatis, floribus minoribus, fructu magno, seminibus multo majoribus crassis differt.

Frutex, ramis fuscis verrucosis. *Folia* opposita, coriacea, elliptica, breviter cuspidata, basibus angustatis, sicca brunnea, 8–9 cm. longa, 3–4 cm. lata, nervis tenuibus 5–6-paribus; petioli 7 mm. longi. *Flores* bini, pedunculo brevissimo, pedicellis gracilibus 1 cm. longis. *Bracteae* ovatae, acutae, coriaceae, minutae. *Sepala* ovata, ferme 1 mm. longa. *Petala* 5, coriacea, ovato-oblonga, 4 mm. longa. *Stamina* 3, filamentis teretibus 1 mm. longis e disco conico-globoso ortis. *Bacca* magna, ultra 6 cm. longa. *Semina* oblonga, dorso rotundata, ventre acuta, 3 cm. longa, 2 cm. lata.

SARAWAK. River bank, Tegora, *Haviland* 823.

This is allied to *S. latifolia* Wall., but differs in the form of the leaves, and in the very large fruit and hard seeds, the largest fruit I know in the genus. The branches of the shrub are angled and warty with lenticels.

Salacia flavescens Kurz.

DUTCH BORNEO. Banjermasin, *Motley* 522: "Large creeper; fruit spherical, 2 to 3 inches in diameter, eatable."

Salacia latifolia Wall.

SARAWAK. Santubong, *Haviland & Hose* 3370; Miri river, *Hose* 537.

BRIT. N. BORNEO. Kudat, Tumbong Gunong, *Fraser* 141, 194.

Not previously recorded from Borneo. This species is really quite distinct from *S. prinoidea* DC., the type form of which is a

narrow-leaved plant from Madras. Intermediate forms I have found in the Malay Peninsula but no true *S. prinoidea* DC. from Borneo. A plant labelled "*Hippocratea prinoidea* DC., Java, legit Korthals" in Herb. Kew. is certainly Wallich's *S. latifolia* which occurs also in Timor Laut and Amboina.

Salacia leucoclada Ridley, sp. nov., a *S. grandiflora* King, cui affinis, foliis minoribus ellipticis, sepalis brevioribus, petalis oblongis, disco altiore cylindrico, stylo longiore differt.

Frutex robustus, scandens, ramorum cortice laevi albo. *Folia* coriacea, sicca nigra, elliptica, obtuse cuspidata, basibus angustatis, 8 cm. longa, 5 cm. lata, nervis subtus elevatis 5-paribus, reticulationibus laxis majusculis subtus elevatis; petioli crassi, rugosi, 2 mm. longi. *Flores* 2 vel 3 in glomerulo axillari, pedicellis 2 mm. longis. *Sepala* breviter ovata, obtusa, imbricata. *Petala* oblonga, obtusa, 3 mm. longa. *Discus* cylindricus, 1 mm. longus, crassus. *Stylus* breviusculus, crassus.

SARAWAK. Beccari 1885.

This is allied to *S. grandiflora* Kurz and in habit resembles a specimen of this species collected in Penang by Curtis (no. 249) which has similar white-barked horizontally spreading branches and small leaves, but the flowers are quite different. The sepals in the present species are much smaller, the petals oblong forming an oblong bud conspicuously different from the globose bud of round petals of *S. grandiflora* Kurz. The disc is much taller and cylindric and the style longer.

Both in *S. grandiflora* and in *S. flavescens* Kurz the leaves in herbarium specimens differ much in form and size according to what part of these great sarmentose shrubs the specimen is taken from.

Salacia minutiflora Ridley, sp. nov., a *S. viminea* Wall., cui affinis, foliis oppositis, petalis minoribus oblongis obtusis, disco cylindrico-conico differt.

Frutex scandens. *Folia* opposita, coriacea, sicca grisea, elliptica, breviter cuspidata, basibus rotundatis, 7-9 cm. longa, 3-4.5 cm. lata, nervis inconspicuis tenuibus 8-paribus; petioli 5-7 mm. longi. *Flores* minuti, in fasciculis parvis axillaribus, pedicellis gracilibus, 5 mm. longis. *Bracteae* plures, ovatae, acutae. *Sepala* ovato-rotundata. *Petala* 5, oblonga, obtusa, 2 mm. longa. *Discus* obtusus, cylindricus, conicus. *Stamina* 3, filamentis in disco immersis, antheris parvis, loculis divaricatis.

SARAWAK. Matang, climber, Haviland 1039.

This is one of the very small-flowered species near *S. viminea* Wall. but with the leaves always opposite and broader. The flowers are slightly smaller and the petals broader and rounder and the disc taller.

Salacia Beccarii Ridley, sp. nov., a *S. Wrayi* King, cui affinis, foliis multo majoribus ellipticis cuspidatis, petalis lineari-oblongis differt.

Frutex, ramis pallidis. *Folia* subcoriacea, sicca atro-brunnea, opposita, elliptica, breviter obtuse cuspidata, basibus breviter angustatis, 10–17 cm. longa, 4·5–7 cm. lata, nervis 6-paribus cum costa utrinque elevatis; petioli validuli, atri, 1 cm. longi. *Bracteae* ovatae, acutae, persistentes. *Racemi* vix 5 mm. longi, pedunculo brevissimo axillari, pedicellis crassis 1 mm. longis. *Sepala* 5, oblongo-ovata. *Petala* lineari-oblonga, obtusa, 2 mm. longa. *Discus* orbicularis. *Filamenta* inclusa.

SARAWAK. *Beccari* 1465, 1806 (type).

In habit this resembles *S. Wrayi* King, but the large leaves drying black are very different.

Salacia Bartletti Ridley, sp. nov., a *S. Beccarii* Ridley, cui affinis, foliis alternis, pedicellis multo longioribus, floribus majoribus, disco undulato differt.

Frutex vel *arbor*, cortice ramorum albescente. *Folia* alterna, coriacea, oblonga vel elliptica, acuminata, obtusa, basibus cuneatis, 8–9 cm. longa, 3·5–4·5 cm. lata, nervis 6-paribus subtus elevatis, secundariis tenuibus inconspicuis; petioli 1 cm. longi. *Flores* in racemis crassis axillaribus 2 mm. longis. *Bracteae* rotundatae, persistentes. *Pedicelli* 5 cm. longi. *Calyx* patelliformis, margine integro, 1 mm. longus, 2 mm. latus. *Petala* coriacea, imbricata, oblonga, obtusa, 2 mm. longa. *Stamina* 3, antheris subsessilibus. *Ovarium* in disco margine undulato immersum. *Stylus* conicus, brevis. *Stigma* capitatum, trilobum.

SARAWAK. Kuching, 17 May 1893, *E. Bartlett*.

Salacia amentacea Ridley, sp. nov., a *S. oblongifolia* Bl., cui affinis, racemis florum in apice pedunculi brevis congestis increscentibus bracteis persistentibus tectis, foliis majoribus ellipticis crassioribus differt.

Frutex alte scandens, glaber. *Folia* opposita, coriacea, lanceolata vel elliptica, acuminata, basibus obtusis, marginibus serratis, 5·5–11 cm. longa, 2–6 cm. lata, nervis 6–8-paribus tenuibus subtus elevatis; petioli 5 mm.–1 cm. longi. *Racemi* breves, 2–4 in apice pedunculi 2 mm. longi, usque 1 cm. longi increscentes. *Bracteae* persistentes, ovatae. *Flores* parvuli, virides vel flavi, pedicellis 1 mm. longis. *Sepala* breviter, coriacea, ovata, obtusa. *Petala* ovato-rotundata, 1 mm. longa. *Discus* tubulosus. *Filamenta* immersa. *Ovarium* conicum, trilobulare, ovulis 3–4 pro loculo. *Bacca* ovoidea, subglobosa, rubra vel saturate lutea, 5 cm. longa, 5 cm. lata. *Semina* plura, obconica, 1·5–2 cm. longa, 1 cm. lata.

SARAWAK. Kuching, *Haviland* 942, 1000, 1626, 2287, 2858; *Haviland & Hose* " = 2858 " (type).

Haviland describes this as a climber 20 feet long with the flowers green or pale yellow, the fruit dark yellow or red. It is rather a remarkable species, allied to *S. oblongifolia* Bl., of Java. The flowers, which are about the same size as those of that species, are borne in racemes two or three of which are carried on a short

peduncle. These racemes gradually elongate as the flowers are produced, from 2 mm. to 1 cm., the stiff ovate bracts persisting. The same type of inflorescence occurs in *S. oblongifolia* Bl. though curiously this is not mentioned by Blume or Miquel.

As often happens in the robust *Salacias* the lower leaves of the shrub are twice the size of the ones on the upper branches.

***Salacia litseifolia* Ridley**, sp. nov., a *S. laurifolia* Stapf, cui affinis, foliis ellipticis lanceolatis cuspidatis, nervis paucioribus, floribus 1-2 sessilibus in glomerulis, petalis oblongis obtusis differt.

Frutex, ramis albescentibus lenticellis copiosis. *Folia* opposita, coriacea, elliptico-lanceolata, cuspidata, cuspidate obtusa curva 1 cm. longa, basibus obtuse cuneatis, 4.5-9 cm. longa, 1.5-3.5 cm. lata, nervis 3-paribus subtus cum reticulationibus elevatis; petioli 2 mm. longi. *Flores* sessiles, 1 vel 2 in glomerulis parvis axillaribus, foliis suffulcientibus saepe delapsis. *Sepala* breviter ovato-rotundata. *Petala* 5, coriacea, oblonga, obtusa, 3 mm. longa. *Discus* ovoideus. *Stamina* 3, recurva.

SARAWAK. Lundu, *Haviland* 871.

This is allied to *S. laurifolia* Stapf, but the leaves are larger, stiffer and wider, cuspidate, with three pairs of nerves. The flowers are sessile and subsolitary, the petals broader, oblong and quite blunt, not lanceolate acute as in *laurifolia*. The pustular branches are very distinct.

***Salacia Klossii* Ridley**, sp. nov., a *S. oblongifolia* Bl., cui affinis, foliis ellipticis obtusis vel breviter acuminatis nec crenulatis, racemis brevibus, floribus minoribus, disco quinquelobo lobis pustulatis differt.

Frutex scandens, glaber. *Folia* subopposita, coriacea, elliptica, obtusa vel acuminata, basibus breviter angustatis vel obtusis rotundatis, 10-12 cm. longa, 5-5.5 cm. lata, nervis elevatis 8-paribus, reticulationibus laxis; petioli 1 cm. longi, teretes, rugosi. *Flores* in racemis 1 mm. longis, pedunculo axillari 2 mm. longo. *Bracteeae* ovatae, acutae, coriaceae, persistentes. *Sepala* 5, ovata, imbricata, obtusa. *Petala* 5, oblonga, obtusa, 1 mm. longa. *Stamina* 3, filamentis triangularibus attenuatis, antheris parvis. *Discus* 5-lobus, lobis papillosis. *Ovarium* conicum.

SUMATRA. Island of Siberut, *Kloss* 14476.

In the "Spolia Mentawiensia" (Kew Bull. 1926, 62) I referred this plant to *S. prinoides* DC., but on re-examination I find it cannot be classed with any form previously identified with that Madras species. The inflorescence is of the same type as that of *S. oblongifolia* Bl. and *S. amentacea* Ridley, the flowers being borne on two short racemes covered with persistent bracts on an axillary peduncle, the racemes probably lengthening as the flowers expand as in *S. amentacea*. The flowers are bigger than those of *S. oblongifolia* Bl. and nearly as large as those of *S. amentacea*.

Salacia castaneifolia Ridley, sp. nov., a *S. grandiflora* Wall., cui affinis, ramis quadrangulatis, foliis longis lanceolatis serratis, floribus paucis, petalis rotundatis differt.

Frutex? ramis validis quadrangulatis. *Folia* opposita, subcoriacea, elliptico-lanceolata, obtusa, basibus cuneatis, marginibus serratis, 14-15 cm. longa, 5-5.5 cm. lata, nervis 12-paribus tenuibus utrinque elevatis; petioli crassi, 1 cm. longi. *Flores* 1 vel 2 in axillis, pedicellis 4 mm. longis crassiusculis. *Bractee* ovatae, obtusae. *Sepala* ovato-rotundata, coriacea. *Petala* 5, viridia, coriacea, rotundata, marginibus membranaceis, 3 mm. longa. *Discus* magnus, subglobosus, flavus. *Stamina* 3, filamentis linearibus brevibus, antheris parvis subrotundatis. *Ovarium* conicum, trilobulatum, ovulis 2 pro loculo horizontalibus. *Stylus* validus, conicus.

SARAWAK. Near Kuching, *Haviland & Hose* 3361.

This plant is really very distinct from any other species known to me in its lanceolate serrate leaves drying green. The flowers to some extent resemble those of *S. grandiflora* in structure. There are only one or two in the axils, with hardly any peduncle.

Hippocratea brachystachys Ridley, sp. nov., ab *H. macrantha* Korth., cui affinis, foliis minoribus, paniculis brevibus, petalis glabris, disco glabro brevi nec stipitato differt.

Frutex scandens, glaber. *Folia* subcoriacea vel coriacea, elliptica, acuminate, basibus rotundatis, marginibus crenulatis, 5-9.5 cm. longa, 2.5-5 cm. lata, nervis 7-paribus tenuibus cum reticulationibus conspicuis; petioli 5 mm. longi. *Panicula* brevis, axillaris, 1.5 cm. longa, pedunculo 1 cm. longo, ramis in apice congestis 5 mm. longis. *Bractee* ovatae, acutae. *Sepala* 5, ovata, rotundata. *Petala* oblongo-lanceolata, extra puberula, intus glabra, 4 mm. longa, viridia. *Discus* pulvinatus, puberulus, haud stipitatus. *Filamenta* lineari-oblonga, 1.5 mm. longa. *Stylus* cylindricus, glaber. *Capsula* obovato-oblonga, multicostulata, valvis 6-6.5 cm. longis 1.5 cm. latis. *Semina* 1 cm. longa, ala terminali oblique oblanceolata 2.5 cm. longa 1 cm. lata.

SARAWAK. Mt. Buan, limestone, *Haviland* 2038; near Kuching, climber, flowers green, *Haviland* 2286 (type).

This is allied to the river-bank *H. macrantha* Korth., but the leaves are smaller and stiffer, the panicles short with smaller flowers, the petals glabrous inside and the ovary and disc not stipitate nor pubescent. The plant from the limestone rocks (no. 2038) has very thick stiff leaves but is otherwise similar to the type.

Hippocratea trilobulata Ridley, sp. nov., ab *H. macrantha* Korth., cui affinis, foliis late ovato-ellipticis, floribus paucis, petalis acuminatis intus barbatis, disco hirto apice lobulis 3 semi-ovatis glabris staminibus alternantibus instructo, ovario stipitato differt.

Frutex. *Folia* opposita, coriacea, elliptico-ovata, obtuse cuspidata, basibus rotundatis, 9-16 cm. longa, 5-10.5 cm. lata, nervis 8-10-paribus cum reticulationibus in utraque pagina conspicua;

petioli crassi, 7 mm. lati. *Cymae* axillares, 2 cm. longae, ramis bifurcatis paucifloris 1 cm. longis. *Bracteae* ovatae, cymbiformes. *Pedicelli* 5 mm. longi. *Sepala* 5, lanceolata, obtusa. *Petala* lanceolata, acuminata, extra puberula, intus barbata, 4 mm. longa, sordide alba. *Discus* stipitatus, hirtus, lobulis tribus semi-ovatis carnosis glabris. *Stamina* 3, filamentis late linearibus recurvis inter lobulos disci ortis. *Ovarium* in stipite crasso cylindrico, triloculare, ovulis in loculis pluribus. *Stylus* glaber, cylindricus.

SARAWAK. Kuching, *Haviland* 2859: "Calyx and corolla dirty white; ovary 3-celled with several ovules in each cell."

This plant is certainly closely allied to *H. macrantha* Korth., differing in the large size of the lower leaves, the biggest in any oriental species of the genus, and more remarkably in the structure of the flowers. The stamens and ovary are borne on a short thick stalk on the top of which is a hairy ring, the true disc, above which are three semicircular fleshy glabrous lobes between which appear the stamens alternating with them. I have not seen this structure in any other species.

Hippocratea macrantha Korth. occurs in SARAWAK: *Beccari* 4063; Rejang, Sibuluan, *Haviland* 2876.

Hippocratea indica Willd. does not appear to be common in Borneo, but has been found at Banjarmasin (DUTCH S. E. BORNEO) by *Motley* (no. 333).

XXXVI—NOTES ON CAREX: IV.* E. NELMES.

THE SECTION ELATAE IN TROPICAL AFRICA.

Of all the sections into which the genus *Carex* is divided in Kükenthal's comprehensive account in Engler's *Pflanzenreich*, 1909, Sect. *Elatae* is the most predominantly African. Ten of the 28 species and varieties there recognised by Kükenthal are from the mountains of Tropical Africa, 4 from the Azores, Madeira, and the Canaries, 3 from the Mascarene Islands, 2 from St. Helena, 2 from Tristan da Cunha, and 2 from South Africa; the remaining 5 being extra-African. It may be of interest to add that two of these are European, two Australian, and one is found in Assam. The proportion from Tropical Africa has grown larger in recent years, as the sedge flora of that area has become better known.

Assuming that the genus *Carex* was boreal in origin—an assumption supported by a consideration of all the available evidence—did the ancestors of the *Elatae* migrate to Africa from the north-west or from the north-east? The evidence appears to be in favour of the north-west, as not only are four species of the section found in the Azores, Madeira, and the Canaries, as mentioned above, but of the two European representatives one is confined to the Iberian Peninsula and the other is found only there and in western Europe. The nearest allied section, *Spirostachyae*, is also strongly represented in south-west Europe and north Africa.

*Continued from K.B. 1938, 110.

The point was made in the first of these Notes (K.B. 1937, 353) that about 10 per cent. of the 700 species comprising the subgenus *Eucarex* have the terminal spike gynaeceandrous, that they mainly comprise the section *Atratae*, and that they mostly inhabit mountains, finding perhaps their greatest development in the Himalayas. On the whole they have darker glumes and utricles than have the rest of *Eucarex*.

It is interesting to compare the *Atratae* with the *Elatae* from the mountains of Tropical Africa. At least half of these species also are gynaeceandrous, not only in the terminal spike but often to a less extent in the lateral spikes as well. Other species found there are androgynaeceous in all the spikes, an equally unusual condition in this subgenus.

Another interesting point, and one having a bearing on the connexion between high altitudes and the gynaeceandrous state, is that the surrounding species of the *Elatae*, in Europe, the Azores, Madeira, the Canaries, St. Helena, Tristan da Cunha, South Africa, and the Mascarene Islands, are very rarely gynaeceandrous, and often have up to three of their upper spikes wholly male, the remaining spikes being usually androgynaeceous.

A third striking thing is that whereas the gynaeceandrous *Atratae* of the mountains of Europe, Asia, and North America are on the whole of similar size to *Carices* of lower lands, the gynaeceandrous *Elatae* of the African mountains are of more than average size.

The *Elatae* in Tropical Africa form very homogeneous groups, and it is not surprising that, owing to this fact and to the paucity of their representation in herbaria, their members have not been very clearly defined.

This paper is an attempt to make these *Carices* better understood, as a preliminary to a general revision of the Tropical and South African species.

Carex vallis-rosetto K. Schum. Three gatherings were cited by Schumann at the end of his description under the above name in Engler's *Pflanzenw. Ost-Afr.* C, 130 (1895): *Holst* 3823, *Volkens* 1291 and 1342, but he omitted to mention which was the type.

Two, if not three, species seem to be represented by these three numbers and it is therefore necessary to ascertain which of them is the type of the name. As the description covers all three numbers and does not fit any one of them more than another, *Holst* 3823 is here accepted as lectotype for the following reasons. (1) It was collected in the Rosetto valley, Usambara, from which the specific epithet was taken, whereas the other specimens were collected elsewhere. (2) It was chosen as lectotype by Kükenthal in *Engl. Pflanzenr.* IV. 20, 647 (1909), where the two *Volkens* sheets were separated from it under the varietal epithet *purpurea*. It is generally agreed that the original choice of a lectotype should not be varied

by subsequent authors unless it can be shown to have been made against the weight of evidence.

Clarke gave a description (in Fl. Trop. Afr. 8, 521: 1902), under the name *C. vallis-rosetto*, based on *Volken* 1291 and 1342, apparently not suspecting that *Holst* 3823, which he had not seen, was not conspecific. This treatment by Clarke cannot be held to be equivalent to typification by exclusion, since he merely described what material was available to him.

Kükenthal, in the Notizbl. Bot. Gart. Berl. 9, 314 (1925), reunited his var. *purpurea* with *C. vallis-rosetto*, stating that further material having come to hand he was convinced that the two could not be kept distinct. However, from a careful examination of the two sheets on which Kükenthal's variety was based I consider that they are specifically distinct not only from *C. vallis-rosetto*, but also probably from each other. As *Volken* 1342 is incomplete and somewhat immature, the description which follows is that of a good specimen, of what may be the same species, collected by Mr. P. J. Greenway on Kilimanjaro. The other *Volken* gathering (1291) differs in a number of minor respects which may not be constant, and its precise determination must await further study.

C. Greenwayi *Nelmes*, sp. nov.; affinis *C. vallis-rosetto* K. Schum., sed utriculis haud inflatis rectis nervosis praecipue differt.

Rhizoma caespitosum, lignosum. *Culmus* 1 m. altus, validus, superne gracilescens, triqueter, laevis, foliatus, basi vaginis aphyllis purpureo-brunneis circumdatus. *Folia* 7–11 mm. lata, plana, pallide viridia, subrigida, acuminata, inflorescentia breviora, marginibus superne scabra; vaginae inferiores fusco-purpureae. *Spicae* circiter 20, androgynaeceae, parte mascula brevi, cylindricae, pendulae, subtenues, subclaxiflorae, plerumque ternae, inaequaliter pedunculatae, inferiores interdum basi compositae, ad 9 cm. longae, superiores subdistantes, inferiores distantes; pedunculi filiformes, angulis leviter hispiduli. *Bractee* inferiores foliaceae, inflorescentia breviores vel eam subaequantes, longe vaginantes, superiores vix foliaceae. *Squamae* femineae oblongo-lanceolatae, fusco-brunneae, marginibus peranguste albo-hyalinae, late viridi-carinatae, in aristam acuminata. *Utriculi* 5 mm. longi, elliptico-lanceolati, trigoni, haud inflati, pallide virides, castaneo-maculati, glabri, plurinerves, haud curvati, in rostrum sublongum ore bidentatum subsensim desinentes. *Nux* oblongo-ellipsoidea, trigona, lateribus concavis. *Stigmata* 3.

TANGANYIKA TERRITORY: Kilimanjaro; Bismarck Hill, damp places, with ferns, in dense shade of *Philippia excelsa*—*Hagenia abyssinica* and *Podocarpus* forest and woodland, 3000 m., 27 Feb., 1934, *Greenway* 3840 (type); Moshi-Marangu, 1000 m., on roadsides, 1 Jan., 1915, *Grote* (B. L. Inst. Amani) 5366 (Herb. Berol.).

Carex cyrtosaccus C. B. Clarke. This species was placed by Kükenthal, in his treatment of the *Elatae*, at some distance from

C. vallis-rosetto, but fifteen years later he wrote up the sheets of Clarke's species in the Berlin Herbarium, as "*C. vallis-rosetto* K. Schum. var. *cyrtosaccus* (Clarke) Kükenth." Of the three gatherings (made by Whyte in Nyasaland), two, from Mt. Malosa and Mt. Zomba, differ from *C. vallis-rosetto* in having the three upper spikes usually wholly male with a few female flowers at the base of the terminal one, the lateral spikes thicker and longer, and the utricles broader and distinctly nerved. The third specimen, from Mt. Milanji, also differs in the same characters except that its utricles are obsoletely nerved as in *C. vallis-rosetto*. Two of the three Nyasaland plants, therefore, are at least varietally distinct from *C. vallis-rosetto*, and the third apparently so, but I propose to leave the precise placing of Clarke's *C. cyrtosaccus* until more material is available.

C. Thomasii *Nelmes*, sp. nov.; affinis *C. vallis-rosetto* K. Schum. sed spicis crassioribus et utriculis rectis nervosis aequaliter inflatis differt.

Culmi 120 cm. alti vel ultra, validi, superne gracilescentes, triquetri, laevi. *Folia* longa, circiter 9 mm. lata, plana, pallide viridia, supra marginibus et nervis scabrida. *Spicae* 9, binae, superiores 2-3 basi et apice masculae medio feminae, caeterae omnino femineae vel interdum apice masculae, cylindricae, pendulae, crassae, densiflorae, 5-8 cm. longae (pedunculo excluso), superiores distantes, inferiores plus distantes, inaequaliter longipedunculatae; pedunculi filiformes, angulis hispiduli. *Bracteae* inferiores foliaceae, inflorescentiam subaequant, longe vaginantes, superiores setaceae vel vix foliaceae. *Squamae* femineae elliptico-lanceolatae, laete rubro-brunneae, basi extremisque marginibus pallidiores, vitta mediana pallida, in aristam longe acuminatae. *Utriculi* squamis aequilongi, 5-6 mm. longi, inflati, recti, membranacei, ellipsoidei, obscure trigoni, straminei, nitidi, glabri, circiter 10-12-nerves, in stipitem brevissimum attenuati, in rostrum longum marginibus hispidulum ore bidentatum subabrupte attenuati. *Nux* elliptica, trigona, lateribus concavis, sublaxe inclusa, brevissime stipitata. *Stigmata* 3.

ANGLO-EGYPTIAN SUDAN: Mongalla; Imatong Mountains, Lomuleng, forest, common, 4 ft., 2400 m., 29 Dec., 1935, *A. S. Thomas* 1794 (type); Imatong Mountains, Feb. 1936, *H. B. Johnston* 1408.

C. elgonensis *Nelmes*, sp. nov.; affinis *C. Mildbraedianae* Kükenth., sed spicis paucis et singulatim dispositis praecipue differt.

Culmi ad 30 cm. alti, subvalidi, triquetri, laevi. *Folia* 5 mm. lata, rigida, inferne planiuscula, superne sulcata, acuminata, marginibus et supra scabrida, culmo multo breviora. *Spicae* 3-6, superiores 1-3 masculae, usque ad 2.5 cm. longae, sessiles, crassae et subobtusae, inferiores 2-3 androgynaeceae, 2.5-3 cm. longae (pedunculo excluso), parte mascula quam feminea breviora,

subdensiflorae, oblongo-ovatae, pedunculatae, cernuae. *Bracteae* inferiores foliaceae et longivaginant, normaliter inflorescentia leviter breviores, rectae et rigidae, tantum superne marginibus scabridae, in apicem coriaceum acuminatae. *Squamae* femineae oblongo-ovatae, acuminatae, fusco-brunneae, in mucronem acuminatae. *Utriculi* 4 mm. longi, squamis subbreviores, obtuse trigoni, elliptico-obovoidei, glabri, membranacei, utrinque obsolete plurinervi, inferne pallidi, superne brunneo-purpurei, basi attenuati, obtusi, in rostrum sublongum teres latum parce hispidulum bidentatum (dentibus leviter divergentibus) subsensim desinentes. *Nux* sublaxe inclusa, elliptico-obovoidea, trigona, faciebus concavis. *Stigmata* 3.

KENYA COLONY: Nyanza Province; Mount Elgon, on banks of stream, 3240 m., 20 Feb. 1935, *G. Taylor* 3474.

C. Preussii K. Schum., from West Africa, which Kükenthal placed as a variety of *C. longipedunculata*, K. Schum. seems to me specifically distinct. It is closely related to *C. simensis* Hochst. ex A. Rich., *C. longipedunculata*, and *C. cuprea* (Kükenth.) Nelm.

Another West Tropical African plant, *Mann* 2099, which Kükenthal cites under *C. simensis*, is for me varietally related to *C. Preussii*. There are three excellent sheets of Mann's gathering at Kew, but the two rather poor specimens of *C. Preussii* are at Berlin.

C. Preussii K. Schum., affinis *C. simensis* Hochst. ex A. Rich., sed vaginis aphyllis brunneis basilaribus, foliis angustioribus, spicis paucioribus brevioribus tenuioribus et minus densifloris, squamis femineis brunneis, utriculis brevioribus et minoribus praecipue differt.

Culmi ad 70 cm. alti, subvalidi, triquetri, angulis inferne laevibus superne scabridis, foliati, basi vaginis aphyllis brunneis circumdati. *Folia* 5-6 mm. lata, culmis breviora, plana vel leviter revoluta, attenuata, pallide viridia, vaginis basilaribus brunneis. *Spicae* 4-5, cylindricae, 3-4.5 cm. longae (pedunculo excluso), subdensiflorae, cernuae, gynaeandreae (terminalis fere 50 pro centum, caeterae breviter masculae), superiores pedunculatae et subdistantes, inferiores longi-pedunculatae et distantes; pedunculi filiformes, angulis scabridis. *Bracteae* inferiores foliaceae, inflorescentia breviores, longivaginant, spicis superioribus vix bracteatis. *Squamae* femineae ovato-ellipticae, brunneae, subobtusae, carinatae, carina pallide viridi, in mucronem excurrentes. *Utriculi* squamis longiores, circiter 4.5 mm. longi, suberecti, membranacei, trigoni, elliptico-lanceolati, straminei, brunneo-maculati, glabri, prominenter plurinervi, basin versus attenuati, punctati, in rostrum longum laevem bidentatum (dentibus subdivergentibus), sensim desinentes. *Nux* oblongo-elliptica, trigona, arcte inclusa. *Stigmata* 3.

BRITISH CAMEROONS: Cameroons Mountain, slope near Mann's Spring, 2600 m., 4 Feb. 1891, *Preuss* 727.

var. **camerunensis** *Nelmes*, var. nov.

Spicae 4–6, 3–5.5 cm. longae. *Utriculi* circiter 5 mm. longi, haud maculati, basi contracti, in stipitem brevissimem desinentes.

BRITISH CAMEROONS: Cameroons Mountain, 2130–3000 m., Dec. 1862, *Mann* 2099. This number was included by *Kükenth*, in *Engl. Pflanzenr.*, IV. 20, 654 (1909), under *C. simensis*.

C. longipedunculata, subsp. *cuprea* *Kükenth.*, is, I consider, of specific rank, and is closely related both to *C. longipedunculata* itself and to *C. Preussii*. It has larger, broader utricles than these species, and the beak of the utricle also differs by being usually sparsely hispidulous. *C. simensis*, var. *stolonifera* (Boeck.) *Kükenth.*, based on *Schimper's* no. 1298 from Abyssinia, also belongs here, as suggested by *Kükenth* at a later date on the type sheet in the Berlin Herbarium, and in *Notizbl. Bot. Gart. Berl.*, 9, 316 (1925).

Several other gatherings are more closely allied to *C. cuprea* than to any other species, but further study and more material are needed before their position can be exactly determined: (1) *Stolz* 2392, from N. of Lake Nyasa, is immature but seems to differ from *C. cuprea* only in having a longer beak to the utricle; (2) a very scrappy specimen collected by Sir Evan James on the Aberdare Mountains, Kenya, is a rather smaller-fruited *C. cuprea*; while, lastly, (3) *Scott Elliot* 7578, from the Ruwenzori district, and *G. Taylor* 1897 from the Virunga Mountains, Uganda, show a still further slight reduction in size and length of utricle. These appear to belong here rather than to *C. Preussii*, the utricle of which is narrower in proportion to its length, and has a smooth beak.

Owing to the contrast between the fuscous glumes of *C. longipedunculata* and the bright copper-coloured ones of *C. cuprea*, the colour difference between the two species is striking. This is enhanced by the relative size of the utricles. The smaller, duller utricles of *C. longipedunculata* are concealed by the glumes, while the larger, brighter ones of *C. cuprea* make their glumes look small. As the beak of the utricle in both these species is of a similar length (c. 1 mm.) it is relatively much shorter in *C. cuprea*, where the whole utricle is between 5 and 6 mm. long, while that of *C. longipedunculata* is only about 4 mm. The length and size of the culms, the width of the leaves, and the colour of the sheaths are similar in the two species.

C. cuprea (*Kükenth.*) *Nelmes*, comb. nov.; affinis *C. longipedunculatae* K. Schum. sed utriculis longioribus latoribus valde nervosis plerumque rostratis marginibus parce hispidulis praecipue differt.

C. aethiopica *Schkuhr* var. *stolonifera* Boeck. in *Linnaea*, 41, 286 (1877).

C. simensis *Hochst.* ex A. Rich. var. *stolonifera* (Boeck.) *Kükenth.* in *Engl. Pflanzenr.* IV. 20, 654 (1909).

C. longipedunculata K. Schum. subsp. *cuprea* *Kükenth.* in *Notizbl. Bot. Gart. Berl.* 9, 315 (1925).

Rhizoma breviter stoloniferum. *Culmi* 0·8–1 m. alti, modice validi, inferne scabridi, triquetri. *Folia* culmo multo breviora, 7–9 mm. lata, plana, superiora infra et marginibus scabrida, coriacea, in acumen acutum sensim desinentes. *Spicae* 4–6, gynaeandreae, terminalis longe caeterae brevius masculae, cylindricae, crassae, densiflorae, 3–5 cm. longae (pedunculo excluso), cernuae, superiores subapproximatae, subsessiles vel breviter pedunculatae, inferiores longe pedunculatae; pedunculi superne angulis scabridi, filiformes. *Bracteae* inferiores foliaceae, inflorescentia breviores, longe vaginantes infra et marginibus scabridae. *Squamae* femineae oblongo-ovatae, utriculis breviores et saepe angustiores, cupreae, carinatae, carina in mucronem excurrente. *Utriculi* 6 mm. longi, conspicue trigoni, late ellipsoidei, demum subpatuli, membranacei, pallide virides, glabri, valde nervosi, basi subattenuati, in rostrum mediocre bidentatum marginibus parce hispidulum subabrupte abeuntes. *Nux* arcte inclusa, trigona, lateribus concavis. *Stigmata* 3.

KENYA COLONY: Mount Kenya; Forest Station, in marsh, 2300 m., 27 Dec., 1921, *Fries* 405; *ibid.*, in a grassy plain, 4 Jan., 1922, *Fries* 734; Mt. Aberdare; on the boundary between hill forest and bamboo region, 3 April, 1922, *Fries* 2763.

ABYSSINIA: near Gafat, 2700 m., 22 Aug., 1863, *Schimper* 1298.

XXXVII—RESEARCHES ON *SILENE MARITIMA* AND *S. VULGARIS*: XXI.* E. M. MARSDEN-JONES AND W. B. TURRILL. FURTHER RESEARCH ON THE GENETICS OF ANTHOCYANIN AND OTHER CHARACTERS IN *S. maritima*.

In K.B. 1929 descriptions were published of *S. maritima* stock-plant A. 12 (p. 150) and stock-plant A. 15 (p. 151). In K.B. 1932, 230, the results of selfing stock-plant A. 12, and in K.B. 1936, 446, the results of selfing stock-plant A. 15 were published. In K.B. 1932, 229 seq., and in K.B. 1935, 215, the results of breeding stock-plant A. 12 with certain other *S. maritima* stock-plants are recorded. The interesting ratios obtained and the difficulty of explaining them made it desirable to extend the research by crossing another anthocyanin-containing stock-plant with S.P. 12 (a plant wholly free from anthocyanin). The stock-plant chosen, A. 15, had very narrow leaves and very much anthocyanin in all parts, except for having white stigmata.

The following scheme shows the series of families made:—

	A. 15 × A. 12	
F ₁	N. 33.	
F ₂	N. 131 = N. 33 plant 23 selfed.	75 plants.
	N. 132 = N. 33 plant 23, female flowers pollinated from hermaphrodite flowers on the same plant.	21 plants.
	N. 133 = N. 33 plant 22 selfed.	58 plants.
	N. 134 = N. 33 plant 1 selfed.	56 plants.
	N. 135 = N. 33 plant 5 selfed.	45 plants.

* Continued from K.B. 1937, 492.

F₁ FAMILY.

N. 33. 43 plants in the family.

Habit : semi-prostrate, uniform.

Stems : up to 3.5 dm. high, with much anthocyanin.

Leaves : intermediate in shape and colour between those of the parents, uniform.

Inflorescence : with from 3 to 7 flowers, which are erect and actinomorphic.

Calyx : narrow-cylindric, with much anthocyanin.

Corolla : with the petals overlapping, segments not overlapping, or contiguous, all bilobed, lobed $\frac{3}{4}$, with good scales, 16 with blotch : 27 with no blotch.

Androecium : filaments all purple ; anthers all purple ; plants all with hermaphrodite flowers.

Gynoecium : stigmata 33 purple : 10 white ; immature seeds all purple.

Fruits : 33 broadly ovoid : 5 obloid.

Seeds : all armadillo.

CHARACTERS OF F₁ PLANTS SELFED.

- Plant 1. No petal blotch ; stigmata purple ; fruits broadly ovoid.
 5. No petal blotch ; stigmata purple ; fruits broadly ovoid.
 22. No petal blotch ; stigmata white ; fruits broadly ovoid.
 23. With petal blotch ; stigmata white ; fruits broadly ovoid.

F₂ FAMILIES.

Habit : semi-prostrate, uniform.

Leaves :

	As A.15	Intermediate	As A.12
N. 131 ...	15	49	8
N. 132 ...	1	19	1
N. 133 ...	3	54	0
N. 134 ...	8	47	0
N. 135 ...	3	38	0
Totals ...	30	207	9

Anthocyanin in vegetative parts :

	Very much	Much	Medium	Little	None	Presence : Absence
N. 131 ...	8	14	32	0	21	} 2.7 : 1
N. 132 ...	1	9	6	0	5	
N. 133 ...	0	30	11	0	17	2.4 : 1
N. 134 ...	6	26	20	0	4	13 : 1
N. 135 ...	6	21	6	0	12	2.75 : 1
Totals ...	21	100	75	0	59	3.3 : 1

Anthocyanin in calyx :

		Very much	Much	Medium	Little	None
N. 131	...	1	8	39	0	21
N. 132	...	0	4	8	0	4
N. 133	...	0	13	25	0	17
N. 134	...	4	6	29	7	4
N. 135	...	5	6	11	1	12
Totals	...	10	37	112	8	58

Calyx shape :

		Narrow-cylindric	Ellipsoid
N. 131	...	36	29
N. 132	...	5	10
N. 133	...	31	19
N. 134	...	38	10
N. 135	...	29	2
Totals	...	139	70

Corolla : petals all bilobed, with $\frac{3}{4}$ lobing, and with well-developed scales.

		Petals overlap	Petals diverge	Segs. overlap	Segs. diverge	Blotch	No blotch
N. 131	...	61	2	59	4	20	44
N. 132	...	15	0	15	0	4	11
N. 133	...	48	0	4	44	2	46
N. 134	...	41	0	2	39	5	37
N. 135	...	24	1	3	22	6	19
Totals	...	189	3	83	109	—	—

Androecium and sex :

	Anthers purple	Anthers yellow-green	Fila-ments purple	Fila-ments white	Flowers herma-phrodite	Flowers herma-phrodite and female	Flowers female
N. 131	30	13	10	33	31	11	22
N. 132	10	1	10	1	4	7	4
N. 133	12	3	8	7	13	2	33
N. 134	25	3	18	10	24	4	14
N. 135	13	2	13	2	13	2	10
Totals	90	22	59	53	—	—	—

Stigmata and immature seed colour :

		Stigmata purple	Stigmata white	Immature seeds purple	Immature seeds white
N. 131	...	29	35	41	19
N. 132	...	9	6	12	4
N. 133	...	24	23	35	12
N. 134	...	26	15	40	4
N. 135	...	17	8	18	11
Totals	...	—	—	146	50

Fruits and seeds :

N. 131	...	Fruits all broadly ovoid ; seeds all armadillo.
N. 132	...	Fruits all broadly ovoid ; seeds all armadillo.
N. 133	...	Fruits all broadly ovoid ; seeds all armadillo.
N. 134	...	Fruits all broadly ovoid, except 1 obloid ; seeds all armadillo.
N. 135	...	Fruits all broadly ovoid ; seeds all armadillo.

DISCUSSION.

Habit : semi-prostrate, typical *S. maritima* habit was shown by all plants, parents, F_1 , and F_2 .

Leaves : a narrow-leaved and a relatively broad-leaved plant were crossed together ; the F_1 was intermediate and the F_2 showed segregation. Scoring in F_2 into classes was difficult, and only plants which could definitely be placed in one or other of the two grand parental classes were separated from the intermediate mass. The ratio for the total figures is 3.3 as A. 15 : 23 intermediate : 1 as A. 12. It may be noted that plants with leaves like A. 12 appeared only in the F_2 derived by selfing one plant (N. 33 plant 23).

Anthocyanin in vegetative parts : a plant with very much anthocyanin was crossed with a plant containing no anthocyanin in any of its parts. The F_1 was uniform, with an intermediate amount of anthocyanin in the vegetative parts. The figures given above are for plants raised to maturity. In addition, all seedlings were scored for presence or absence of anthocyanin. Adding the two sets of figures together the following results were obtained :

Family		Anthocyanin present	Anthocyanin absent	Ratio
N. 131 and N. 132	...	335	116	2.9 : 1
N. 133	...	159	87	1.8 : 1
N. 134	...	319	94	3.4 : 1
N. 135	...	195	42	4.6 : 1
Totals	...	1,008	339	3.0 : 1

The above figures, in spite of unexplained differences in the ratios for certain of the families, probably represent a 3 : 1 ratio.

In K.B. 1932, pp. 236-8 we published results that suggested that stock-plant A. 12 had the factorial composition, for anthocyanin absence in the vegetative parts, aaBBii—A and B being complementary factors, both necessary for the production of anthocyanin in the vegetative parts ; and I an inhibitor for such colour production and distribution. The results published in this paper support this interpretation. Stock-plant A. 15 would, on the basis of the same experiments, and using the same set of symbols, have the composition AABBi. Thus on crossing A. 15 with A. 12, the F_1 should uniformly have anthocyanin, as it did, and the F_2 should segregate in the ratio 3 : 1, as it did for the total of the families.

A. 15 was known to segregate on selfing for degree of anthocyanin development, and segregation of a similar kind also occurred in the F_2 families from F_1 plants with somewhat diluted anthocyanin. There are probably two or more factors concerned with intensification and dilution of anthocyanin coloration in the vegetative parts.

The importance of large families, and preferably the scoring of all plants raised from seed, is indicated by the different ratios obtained when only adult plants were scored and when all seedlings were also included. It is difficult to avoid unconscious selection in planting out a sample from the seed boxes.

Anthocyanin in calyx: the figures suggest strongly that the same set of factors act, for anthocyanin presence or absence and for degree of development, in the calyces as in the vegetative parts. The differences in the actual figures are due to the fact that not all plants flowered and some could not, therefore, be scored for calyx characters, and probably a time (or position) factor is also involved. The totals for plants with coloured calyces show a less intensity of anthocyanin development compared with the totals for anthocyanin in vegetative parts. It is interesting to recall that when indumentum is present in *Silene vulgaris* (or hybrids) it "is most dense a few internodes above the base and ends completely below the last pair of foliage leaves. We have never seen pubescence in the inflorescence region or on the calyx" (K.B. 1931, p. 125). Our considerable additional experience since 1931 confirms this statement. Thus, though the genes for indumentum are present above their place of (or beyond their time of) action, since they are transmitted through the gametes, they cease action below the inflorescence region, or, as it may also be expressed, at a certain time in full life-history development. It is suggested that this compares with the action of the anthocyanin gene-complex, but that the action of the latter is less reduced.

Calyx shape: the original cross was between a plant with a narrow-cylindric calyx (A. 15) and one with an ellipsoid calyx (A. 12). F_1 had uniformly narrow-cylindric calyces. F_2 showed segregation in the ratio 2 : 1.

Corolla: the parents and F_1 had overlapping (or contiguous) petals. F_2 had 3 plants, out of a total of 192 scored, some, at least,

of whose flowers showed petals diverging (not overlapping or contiguous). These were probably fluctuations due to non-genetical factors. A. 15 had segments diverging, A. 12 had segments overlapping or contiguous. F₁ had segments all diverging. F₂ showed segregation in different (and obscure) ratios for the different families. A. 15 had an anthocyanin blotch, A. 12 had no blotch. F₁ showed segregation as did all F₂ families. Obviously an inhibiting effect must have been present in some F₁ plants.

Androecium : A. 15 had purple anthers and filaments, A. 12 had yellow-green anthers and white filaments. F₁ plants had all purple anthers and filaments. F₂ families all segregated, the plants with coloured androecium being predominant.

Sex : A. 15 and A. 12 were hermaphrodite, but segregated on selfing into hermaphrodite and female. All F₁ plants, at the time of scoring, were hermaphrodite. All F₂ families showed segregation. As data for sex genetics in *Silene* are being collected no further discussion of the subject is undertaken here.

Stigmata : A. 15 and A. 12 had white stigmata ; A. 15 segregated for this character on selfing ; A. 12 bred true on selfing. F₁ showed segregation, a cross between two plants with white stigmata giving 33 coloured : 10 white. F₂ families all showed segregation, whether obtained by selfing F₁ plants with purple or sibs with white stigmata. There appear to be both the action of complementary genes and inhibiting effects shown by the results.

Immature seed colour : A. 15 had purple and A. 12 white immature seeds, and bred true on selfing for this character pair. F₁ had all purple seeds. F₂ families all segregated and their summated figures gave a ratio of 3 coloured : 1 white.

Fruits : A. 15 had obloid and A. 12 broadly ovoid fruits. F₁ showed segregation. F₂ families, from broadly ovoid F₁ plants, showed all broadly ovoid capsules, except one plant in N. 134, with obloid capsules. As previously recorded, capsule shape shows much fluctuation and it is sometimes impossible to be certain of the exact class into which capsules from a given plant should be scored.

Mature seeds : parents, F₁, and F₂ plants all showed the recessive character of armadillo seeds.

SUMMARY.

Two plants of *S. maritima* were crossed together. The ovule parent (A. 15) had very much anthocyanin in all parts, except the stigmata ; the pollen-parent (A. 12) was entirely devoid of anthocyanin in all parts. The F₁ plants uniformly showed much anthocyanin in all parts, except for segregation in the stigmata. The F₂ families showed segregation for colour in all organs. From the results detailed in this paper and from results of other experiments previously published in this series it is clear that complementary and inhibiting genes are both involved in colour presence or absence. In addition, it now seems probable that one set of genes is basically

responsible for anthocyanin development wherever it occurs in the plant. Locally or temporally acting modifiers, however, intensifying, diluting, or inhibiting, prevent, when they are present, uniformity of action by this basic set in all parts developing successionaly on a given shoot system of any one individual. Modifying effects are the product of: (1) genes of strictly circumscribed action; (2) genes whose action is less pronounced in later growth phases of a given shoot; and (3) factors environmental to gene action.

Other characters whose genetic inheritance is considered are: habit, leaf-shape, calyx-shape, overlapping of petals and segments, sex, fruit-shape, and sculpturing of testa.

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XXXVIII—EXTRA-FLORAL NECTARIES ON OSMANTHUS LEAVES. C. R. METCALFE.

Sir John Farmer, F.R.S., recently drew attention to the fact that drops of liquid are secreted from glands on the lower surfaces of the leaves of various species of *Osmanthus* where they are situated at the base of the lamina, just above the short petioles. He noted that the drops are not secreted very frequently during the winter months, and in the commonly cultivated species, *O. ilicifolius* Mouillef., the maximum secretion was observed during the summer when considerable numbers of wasps were attracted to the bushes.

The earliest account of the secretion of drops of liquid from the leaves of *Osmanthus* that has been traced is that written by Delpino in 1886 (1). His description is given under the name *Olea fragrans*, which is a synonym for the plant now known as *Osmanthus fragrans*. He states that numerous pits occur on all parts of the lower surface of the leaf, at the base of each of which there is generally a single glandular trichome. In a few of the pits two or three trichomes were present, whilst at the bases of the leaves there were six to ten or more still larger ones which contained from twenty to fifty or even greater numbers of trichomes. The larger aggregates of trichomes were classified as nectaries because they secreted drops of sugary liquid at certain times of year, notably in August. Delpino also mentions that no secretion from the solitary trichomes was apparent.

Since then the nectaries on the leaves of *Osmanthus* do not appear to have attracted much attention, although the existence of similar bodies has been recorded in a number of other genera of the *Oleaceae*. More recently Zimmermann (2) in a long account of the morphology of extra-floral nectaries and their occurrence amongst different families of Angiosperms, refers to Delpino's description of *Olea fragrans* without mentioning that this species is now known as *Osmanthus fragrans*.

In view of the fact that no first hand observations on the nature of the secretory glands and the time of year at which they are most

active, appear to have been recorded since Delpino's account was published, a number of *Osmanthus* bushes at the Royal Botanic Gardens, Kew, were kept under observation during 1937. The species to which most attention has been paid is *O. ilicifolius*, in which the nature and distribution of the nectaries so closely resemble those of *O. fragrans* that Delpino's remarks seem to be equally applicable to both species. It seemed worth while, however, to examine the glands in rather more detail and also to publish figures showing their microscopical structure, which has not previously been done.



1



2

Fig. 1. Transverse section through solitary trichome on under surface of leaf of *Osmanthus ilicifolius*.

Fig. 2. Transverse section through group of trichomes forming a small nectary. Both $\times 265$.

A transverse section passing through one of the solitary trichomes on the under surface of a leaf of *Osmanthus ilicifolius* is illustrated in fig. 1, whilst part of a group of them constituting one of the smaller nectaries is shown in fig. 2. Each trichome consists of a head of parenchymatous cells with dense protoplasmic contents and large nuclei supported by a short stalk, usually consisting of one cell, which arises directly from a sunken part of the lower epidermis. Many of the mesophyll cells near the trichomes are also filled with dense protoplasmic contents and possess large nuclei, but this is not shown in the figures for the sake of simplicity. The outer walls of the epidermal cells are covered by a thick cuticle shown in black. Zimmermann (l.c.) states that the heads of the glandular trichomes of the *Oleaceae* differ from those in other families in having no cuticle. This does not seem to apply in the case of *Osmanthus ilicifolius*, where microchemical tests indicate the presence of cuticle in this region, although it is not so thick as on the outer walls of the adjacent epidermal cells. The cuticle on the stalk cells is so thick that it fills the spaces between neighbouring trichomes. Where the trichomes are not contiguous the epidermal cells between them are also provided with a thick cuticle.

It has been possible to confirm that at certain times of year the glands secrete drops of sugary liquid which are a great source of attraction to wasps. It is noteworthy, however, that although nectaries are always present on the leaves, those on some bushes secrete far more actively than those on others. Warm humid conditions appear to favour secretion, and it is interesting to watch the manner in which the wasps are attracted directly to the glands. They very rarely alight on the upper surfaces of the leaves where there are no glands, whilst on the lower surfaces they land as close to the nectaries as possible. They never search for them at the distal ends of the leaves. The proportion of leaves on which the glands are secreting varies from time to time throughout the day as well as on consecutive days. When secretion is not proceeding actively, very few or no wasps were to be seen near the bushes. It has not been found possible to stimulate secretion during the winter by placing cut shoots in water under bell jars in a warm greenhouse, although this treatment is often effective on summer days when secretion is not proceeding out of doors.

It is very tempting to speculate whether the visits of the wasps confer any benefit on the plants, but it seems more reasonable to suppose that the glands serve merely for the excretion of excess carbohydrate. The fact that wasps are attracted probably has no greater significance than the visits made by these insects to apple orchards to obtain nourishment from the fruit.

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XXXIX—THE CORRECT NAME OF THE COMMON PARSLEY. H. K. AIRY-SHAW.

In H. Wolff's account of the genus *Petroselinum* (in Engl. Pflanzenr. iv. 228. Heft 90. 63: 1927), the name of the common parsley is given as *P. hortense* Hoffm. (Gen. Pl. Umbellif. 163, 166 [explic. iconum]: 1814). In synonymy, however, are quoted the earlier names *Apium vulgare* Lam. (Fl. Franç. **3**, 444: 1778), *A. laetum* Salisb. (Prodr. Hort. Chap. Allert. 169: 1796), *A. romanum* Zuccagni (in Roem. Collect. 135: 1809), and further, under the varieties *latifolium* and *crispum*, the still earlier names *Apium latifolium* Mill. and *A. crispum* Mill. (Gard. Dict. ed. 8: 1768). It is thus evident that the adoption of the name *P. hortense* is contrary to the rule of priority (Art. 16). In any case the name was not validly published by Hoffmann,* being unaccompanied by any

* The name *Petroselinum sativum* Hoffm. l.c. 178 (in indice), on the other hand, is validly published, since a description is provided on the page (78) referred to.

synonym or "reference to a previously and effectively published description," and the figure consisting exclusively of dissections (not a "plate or figure *with* analyses": see Art. 37, Intern. Rules ed. 3, 10 : 1935).

Miller (l.c.) described the parsley under three distinct species: *Apium Petroselinum* L., *A. crispum* Mill. and *A. latifolium* Mill. The first is not explicitly cited by Wolff either under the species *P. hortense* or under a variety. The Linnean epithet *Petroselinum* is unfortunately precluded from use under the tautonym rule. The specific epithet *latifolium* has apparently never yet been employed under the generic name *Petroselinum*. The epithet *crispum*, however, was (as noted by Wolff) employed under this genus *in synonymy*, for some unexplained reason, by Nyman, Consp. Fl. Eur. 309 (1879). This does not, of course, constitute valid publication: see Art. 40. But the combination has been taken up in the Kew Hand-List of Herbaceous Plants, ed. 3, 122 (1925), and attributed to Nyman; and it appears that it must be regarded as validly published in that place. (Cf. Sprague and Green on *implicit* citation in the case of the generic name *Epipogium*, in Kew Bull. 1937, 475).

The correct nomenclature and relevant synonymy of the parsley and of the varieties recognized by Wolff will therefore be as follows:—

Petroselinum crispum (Mill.) Nym. [Consp. Fl. Eur. 309 (1879), pro syn. *P. sativi* Hoffm.] *ex auct. anon.* in Hand-List Herb. Pl. Kew, ed. 3, 122 (1925).

Apium Petroselinum L. Sp. Pl. ed. 1, 264 (1753); Mill. Gard. Dict. ed. 8 (1768).

A. Petroselinum α *angustifolium* Hayne, Getr. Darst. u. Beschr. Arzn. Gebr. Gewächse, 7, t. 23 (1821).

Carum Petroselinum (L.) Benth. in Benth. et Hook. f. Gen. Pl. 1, 891 (1867).

Petroselinum Petroselinum (L.) Karst. Deutsche Fl. Pharm.-medic. Bot. 831 (1880–83).

Selinum Petroselinum (L.) E. H. L. Krause in Sturm's Fl. Deutschl. ed. 2, 12, 41 (1904).

var. **crispum** (Mill.) Airy-Shaw, comb. nov.

Apium crispum Mill. l.c.

A. Petroselinum var. *crispum* (Mill.) Willm. Alph. Enum. Pl. Hort. Kew. 16 (1798); Pers. Syn. 1, 324 (1805).

A. Petroselinum γ *crispifolium* Hayne, l.c.

Petroselinum vulgare S. F. Gray var. *crispum* (Mill.) S. F. Gray, Nat. Arr. Brit. Pl. 2, 524 (1821).

A. Petroselinum var. *vulgare* Nois. Man. Compl. 2, 421 (1825).

P. sativum Hoffm. var. *crispum* (Mill.) Gaud. Fl. Helv. 2, 423 (1828); DC. Prodr. 4, 102 (1830); Alef. Landwirthsch. Fl. 152 (1866).

P. sativum subvar. *crispum* (Mill.) Coss. et Germ. Fl. Env. Par. ed. 2, 254 (1861).

P. sativum var. *vulgare* (Nois.) Alef. l.c.
Carum Petroselinum var. *crispum* (Mill.) Beck, Fl. Niederösterr. **1**, 621 (1892).

Petroselinum hortense Hoffm. var. *crispum* (Mill.) Bailey, Man. Cult. Pl. 564 (1924) ; Wolff in Engl. Pflanzenz. l.c. 65 (1927).

var. **latifolium** (Mill.) Airy-Shaw, comb. nov.

Apium latifolium Mill. l.c.

A. Petroselinum var. *latifolium* (Mill.) Hayne, l.c.

Petroselinum vulgare var. *latifolium* (Mill.) Gray, l.c.

P. sativum β *latifolium* (Mill.) Gaud. l.c. ; Alef. l.c.

P. sativum subvar. *latifolium* (Mill.) Coss. et Germ. l.c.

P. sativum var. *silvestre* Alef. l.c.

Carum Petroselinum var. *typicum* Beck, l.c.

Petroselinum hortense var. *latifolium* (Mill.) Wolff, l.c.

var. **anatolicum** (Freyn et Sint.) Airy-Shaw, comb. nov.

Petroselinum anatolicum Freyn et Sint. ex Freyn in Österr. Bot. Zeitschr. **44**, 99 (1894).

P. hortense var. *anatolicum* (Freyn et Sint.) Wolff, l.c.

XL—ANATOMY OF FRAXINUS OXYCARPA AND F. PALLISAE.* C. R. METCALFE.

The wood structure of the genus *Fraxinus* is so conservative that many of the species which are used commercially cannot be distinguished with certainty when only the timber is available for identification. This is shown by the descriptions and photomicrographs of the North American species of *Fraxinus* given by Professors Record (4) and Brown (1) in their respective books. Chalk and Rendle (2) also note that the structure of the various species of *Fraxinus* is very uniform. The wood structure of the genus has also been examined by Sax and Abbe (5). These authors state that the secondary xylem of *Fraxinus* exhibits characters which differentiate it rather sharply from that of various other genera of the *Oleaceae* which they examined. They give a single brief description of the wood structure to cover the various species which they examined, and they, like the authors already mentioned, found the interspecific differences to be small, and do not deal with them in detail in their account. It is not, therefore, surprising that no reliable anatomical characters have been found in the 5-year old stems (coll. H. G. Tedd, Thrace : Mesta Delta) of the closely related species *F. oxycarpa* and *F. pallisae*, whereby they may be distinguished from one another. The stems are provided with a thin, smooth bark. The wood is whitish when freshly cut, but darkens to a light brown on exposure. Cross sections show that the wood is markedly ring-porous.

*This paper supplements the author's appendix to Anderson & Turrill's account in New Phyt. **37**, 160 (1938).

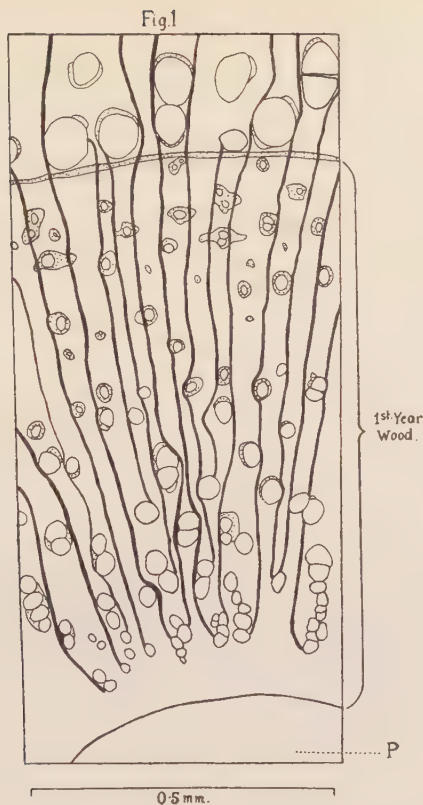


Fig. 1. Transverse section of first, and beginning of second year wood in a stem of *Fraxinus oxycarpa*. Dotted areas represent parenchyma. Solid black lines represent medullary rays.

MICROSCOPICAL STRUCTURE OF THE WOOD. (Fig. 1.) *Vessels*.—Radial diameter of solitary vessels in the early wood $40\text{--}108\mu$, those in late wood $17\text{--}40\mu$, but majority seldom exceeding 17μ . Pores solitary or in multiples of 2 or rarely 3. Individual pores of a multiple usually radially disposed, although tangential multiples present in places. Mostly in irregular clusters. Vessels of late wood predominantly solitary, generally more or less completely surrounded by a single layer of parenchyma cells, thus having an appearance recalling that of secretory canals. Small vessels of late wood have thicker walls than the large vessels of the early wood. Vessels situated nearest to the pith mostly in radially disposed chains of 5 or more. Vessel perforations simple, mostly horizontal or slightly oblique. Pits between vessels small, circular, with horizontal apertures. Vessel-ray pits similar. *Fibres*.—Groundwork of wood composed of rather thin-walled fibre-tracheids, mostly hexagonal in transverse section, but the smaller ones quadrilateral. Pits numerous on radial walls, mostly with obliquely orientated apertures,

sometimes crossed. Apertures of pits sometimes extending beyond the border. *Parenchyma*.—Chiefly in concentric zones 1–3 cells broad at boundaries between consecutive seasons growth (terminal parenchyma). Paratracheal parenchyma also present, partly surrounding the larger vessels or vessel multiples of the early wood. Smaller vessels of late wood often completely surrounded by (vasicentric) parenchyma. The latter sometimes with short aliform extensions, the latter rarely uniting individual vessels or vessel-multiples. *Rays*.—Uniseriate and biseriate. Biseriate rays with uniseriate endings (tangential section). Heterogeneous, majority of cells procumbent. Upright cells mostly situated at the margins of rays. Rays 2–33 (mostly 4–20) cells high.

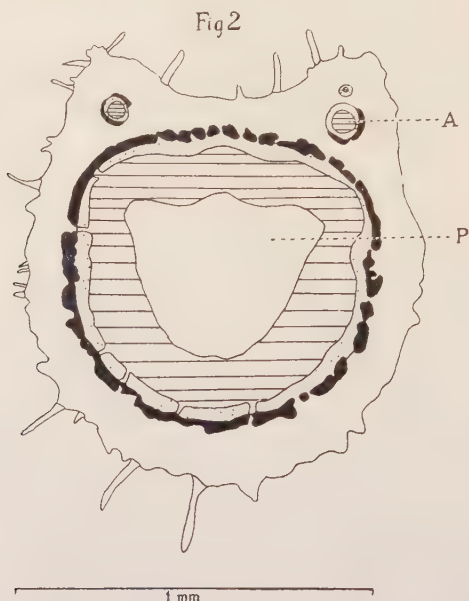
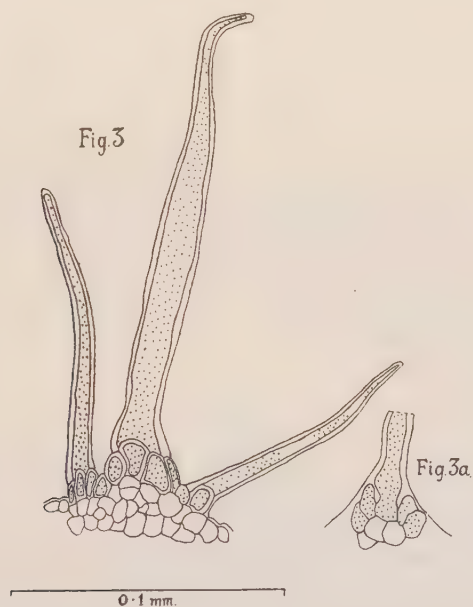


Fig. 2. Transverse section passing through the centre of the petiole of *Fraxinus Pallisae*. A. Accessory vascular strand. P. Pith. Xylem marked by parallel lines. Phloem marked by dots. Schlerenchyma solid black.

PETIOLE STRUCTURE.—Petit (3), referring to the petiole of *Fraxinus excelsior* says:—"Le système libéro-ligneux se compose d'un anneau central et de quatre petits anneaux latéro-supérieurs. Ces anneaux sont entourés de fibres sclereuses." The same type of structure is characteristic of the petiole of *F. oxycarpa* and *F. Pallisae*. In transverse section the adaxial surface is generally concave and the abaxial surface roughly circular (Fig. 2). Within the small-celled epidermis there are 3–4 layers of collenchymatous tissue, surrounding a cortex of rather loosely arranged parenchyma cells. Passing towards the centre, the stele is enclosed in a sheath of sclerenchyma external to the phloem. Some of the medullary rays extend from the xylem across the phloem to the

sclerenchyma. In some instances the ray cells tend to take up lignin stains, so that the phloem appears as if it were divided into separate compartments in double stained sections. Within the phloem is a continuous xylem ring, and the centre of the petiole is occupied by a solid parenchymatous pith. On the adaxial side of the petiole there are generally 2 or sometimes more separate vascular strands, consisting of xylem at the centre more or less completely surrounded by phloem. Outside the phloem a complete or interrupted ring of sclerenchyma is present. These subsidiary vascular strands, which arise as branches from the main central one, sometimes themselves give rise to further strands, so that in some parts of certain petioles several subsidiary strands may be seen in addition to the normal 2. From other petioles, on the contrary, subsidiary vascular strands are absent altogether.



Figs. 3 and 3a. Epidermal hairs from the petiole of *F. Pallisae*.

When sections of *F. oxyphylla* and *F. Pallisae* were first examined it was noted that the subsidiary strands in *F. Pallisae* were very considerably larger in diameter than those in *F. oxyphylla*, and it was hoped that this difference might serve as a diagnostic feature for the two species. Since then, however, sections of a number of petioles from both species have been examined, and it has been found that the size and number of the subsidiary vascular strands varies considerably. The only feature of the petiole which appears to be reliable for separating the two species is that unicellular hairs, with rather thick walls are present in *F. Pallisae* and absent from *F. oxycarpa*. These hairs are somewhat swollen at the base,

but taper to an apical point (Figs. 3 and 3a). Fig. 3 shows a group of these hairs with the bases, as seen in most sections, surrounded by rather enlarged epidermal cells, often with granular contents. Fig. 3a shows the appearance of the base of a single hair in a section passing through its centre. The hairs are specialized epidermal cells with thickened walls, and are generally filled to a greater or less extent with granular material.

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XLI—A NEW EUGENIA FROM ASSAM. KALIPADA BISWAS.

Eugenia assamica Biswas et Purkayastha, sp. nov.; foliis majoribus obovatis vel obovato-ellipticis coriaceis, venis lateralibus intra marginem arcuatim anastomosantibus, fructu magno ellipsoideo siccitate extus rugoso distinguenda.

Arbor magna, 20-22 m. alta, cortice rugoso. *Folia* breviter petiolata, obovata vel obovato-elliptica, superne late rotundata, abrupte breviter acute cuspidata, inferne deltoideo-angustata, 24-40 cm. longa, 11.5-19 cm. lata, integra, coriacea, glabra, venis lateralibus multis subhorizontalibus prominentibus 1-2.5 cm. remotis intra marginem arcuatim anastomantibus; petioli 2-3 cm. longi. *Cymae* laxae, pauciflorae, e ligno vetere ortae, minute bracteatae, bracteis lanceolatis acutis 8 mm. longis 2 mm. latis. *Flores* pedicellati, pedicellis 0.5-1.5 cm. longis rugosis. *Calyx* 1-1.5 cm. longus, apice circiter 1 cm. latus, obconico-campanulatus, in sicco extus rugosus, 4-lobulatus, lobulis persistentibus crassis rotundatis vel obtussissimis concavis circiter 5-6 mm. diametro in sicco coriaceis. *Petala* 4, alba, decidua, concava, rotundata, 5-8 mm. diametro, membranacea, glabra. *Stamina* numerosa, 1.5-1.8 cm. longa. *Ovarium* 2-loculare, circiter 1.5 cm. longum, 1 cm. diametro; stylus elongatus, subulatus, circiter 2 cm. longus. *Bacca* oblongo-ellipsoidea, 4-5 cm. longa, 3 cm. lata, pericarpio in sicco extus rugoso. Semina singula, circiter 3 cm. longa, 1.5 cm. diametro, lignosa, brunnea, extus rugosa.



F.B.Das et S.R.C. (del).

Eugenia assamica Biswas et Purkayastha.

1. Seedling, $\times \frac{1}{2}$. 2. Mature leaf with flowers, $\times \frac{1}{2}$. 3. Cyme with mature flowers, $\times \frac{1}{2}$. 4. Flower bud, $\times \frac{1}{2}$. 5. Flower bud cut open showing folded stamens, pistil and ovules, nat. size. 6. Stamen, nat. size. 7. Flower separated out, showing calyx lobes and petals, $\times \frac{1}{2}$. 8. Fruit, $\times \frac{1}{2}$.

Middle-sized tree attaining a height of up to 22 m., girth about 2 m.; bark grey, about 3 mm. thick, coming off in flakes. Older branchlets terete, younger compressed, somewhat quadrangular. *Leaves* shortly petioled, obovate or obovate-elliptic, widely rounded above, abruptly acutely cuspidate, base shortly narrowed, deltoid, 24–40 cm. long, 11.5–19 cm. broad at the widest portion, entire, coriaceous, lateral veins subhorizontal, prominent, many, up to 21 in larger leaves, placed at a distance of 1–2.5 cm. anastomosing about 1 cm. within the margin to form an intramarginal longitudinal prominent vein running from the base to the apex, sometimes flanked by a similar rather less prominent longitudinal vein in between the margin and the stronger intramarginal looping vein, the lateral veins joined by numerous thinner irregular anastomosing veinlets forming areoles, texture coriaceous, glabrous above, somewhat glaucous beneath; petioles thick, somewhat compressed quadrangular, 2–3 cm. long. *Cymes* lax, few-flowered, developing from the old wood in the axils of often fallen leaves, bracteate, bracts minute, lanceolate, acute. *Flowers* pedicellate, pedicels 0.5–1.5 cm. long, rather rough when dry. *Calyx* 1–1.5 cm. long, about 1 cm. broad at the apex, obconic-campanulate, rough when dry, 4-lobed, lobes persistent, succulent, very obtuse or rounded, concave, thicker in texture at the middle, acute, rather coriaceous when dry, nearly as long as broad, about 5–6 mm. in diameter. *Petals* 4, white, deciduous, concave, rather thick at the middle, membranous, rounded, almost as long as broad, 5–8 mm. in diameter, smooth. *Stamens* many, 1.5–1.8 cm. long. *Ovary* bilocular, about 1.5 cm. long, 1 cm. broad, few-ovuled; style elongate, about 2 cm. long. *Fruit* baccate, oblong-ellipsoid, 4–5 cm. long, 3 cm. in diameter, pericarp hard and rough when dry. *Seeds* single, oblong, often slightly depressed on one side, about 3 cm. long, 1.5 cm. in diameter, woody, brown, rather rough on the exterior.

ASSAM. Pasighat, near Pillung forests, June, 1936, C. S. *Purkayastha* 13491 (typus in Herb. Calcutt.); March 30, 1936, C. S. *Purkayastha* 13490 (Herb. Kew); July 23, 1935, C. S. *Purkayastha* 13070; Jorhat, a tree in shady river banks, flowers from old wood, February 1935, C. S. *Purkayastha* 13.

Eugenia assamica resembles the large-leaved species *E. xylantha* Greves (New Guinea) and *E. sarcocarpa* Merr. and *E. samerensis* Merr. (Philippines), but differs entirely from these in the characteristic shape, size and venation of its leaves, and in the structure of the flowers and fruits.

XLII—MISCELLANEOUS NOTES.

Mr. A. D. Cotton.—Mr. Cotton, Keeper of the Herbarium and Library, has been elected a corresponding member of the Botanical Society of Czechoslovakia.

King's Birthday Honours.—We have much pleasure in recording the conferment of the following Honours:—

C.M.G.—Mr. G. A. JONES, Commissioner of Agriculture, Imperial College of Tropical Agriculture, Trinidad. C.V.O.—Mr. T. HAY, M.V.O., Superintendent, Central London Parks (Hyde Park). O.B.E.—Dr. G. BRYCE, Assistant Director of Agriculture, Nigeria; Dr. S. E. CHANDLER, Principal of the Plant and Animal Products Department, Imperial Institute; Mr. H. M. GARDNER, Conservator of Forests, Kenya Colony. M.B.E.—Mr. W. G. LECKIE, Senior Agricultural Officer, Kenya Colony; K. RAMAYYA, Paddy Specialist at the Agricultural College and Research Institute, Coimbatore, Madras.

Chronica Botanica.—In K.B. 1937, 517, the proposed new method of issuing this periodical was described. The first two bi-monthly numbers (vol. 4, nos. 1 and 2) have now appeared and it is possible to form an opinion on the changes carried out.

There is no doubt that *Chronica Botanica* now forms an extremely valuable periodical which will appeal to a wide circle of botanical readers. The scientific communications reach a high level, while the discussion forum provides a welcome means of international botanical discussion. These sections, together with those giving news of institutions and individual botanists, combine to form a much needed focus for international co-operation in botanical science. Dr. Verdoorn and his collaborators are to be congratulated on their enterprise and initiative in carrying out a project which must entail a great deal of laborious work.

The Botanical Magazine.—"Curtis's Botanical Magazine" was first published in 1787 and continued to appear without a break until the year 1920, when the increasing cost of production led Messrs. Lovell Reeve to terminate publication with Volume 146. The following year a number of leading horticulturists purchased the copyright and presented it to the Royal Horticultural Society, under whose auspices publication was re-started in 1922 and has continued ever since. Entirely new arrangements had to be made for the production of the Magazine and a certain amount of delay was inevitable, so the Society decided to re-commence publication with the volume for 1922, that is Vol. 148, which meant that a gap was left in the series of volumes to be filled later on by the volume for 1921, Vol. 147. This volume the late Mr. Reginald Cory very generously offered to produce at his own expense, and now, after an interval of seventeen years, the long awaited Volume 147 has been published.*

The volume is dedicated, in accordance with Mr. Cory's wishes, to Sir Isaac Bayley Balfour, Lt.-Col. Sir David Prain, and Sir

* "Curtis's Botanical Magazine," vol. 147. Edited by John Ramsbottom, O.B.E., D.Sc., M.A., P.L.S. Bernard Quaritch, Ltd., London. Published May 2nd, 1938.

Frederick Moore. Previous volumes of the Botanical Magazine had been dedicated to each of them individually, and the dedication of this volume to them jointly was suggested by the fact that they all retired at about the same time from their posts as heads of the botanical establishments at Edinburgh, Kew and Glasnevin respectively. The volume is edited by Mr. J. Ramsbottom, and contains a preface by Mr. E. A. Bowles, in which the circumstances surrounding its production are outlined. No reference is made, however, to the part played by the late Dr. O. Stapf in the production of the volume, and we may therefore mention that Dr. Stapf was asked to take charge of the work in April 1928. The volume now published is just as it was planned by Dr. Stapf, except that three of the plates originally selected have been replaced by others. At the end of the year 1932, all the plates had been drawn and printed off, all the colour patterns had been prepared, a considerable part of the colouring of the plates had been done, and the text of the first half of the volume (the greater part written by Dr. Stapf himself), was in print. Unfortunately early in 1933 Dr. Stapf found he could no longer continue the work, so Mr. Cory handed over the Editorship to Mr. Ramsbottom under whose auspices, after some five years, the volume has now been published.

The volume contains 5 quarto and 50 octavo plates. Three of the plates (8891, 8901 and 8929), have been reproduced in colour by a photographic process; three other plates (8874-75, 8889-90 and 8915), have also been reproduced mechanically, as Mr. Cory had arranged to have them printed by a chromo-lithographic process, whilst the remainder are hand-coloured in the usual way. The presence of the mechanically reproduced plates is an innovation so far as the Botanical Magazine is concerned, and it cannot be regarded as a particularly successful one, for the plates mentioned do not compare very favourably with the usual standard of hand-coloured plates. The colouring of the latter in the copy before us is, however, noticeably unequal, and some are not very satisfactory; especially is this the case with plates 8895 and 8899, where the dull yellow colour of the flowers is incorrect, and in plates 8893 and 8918, where the colour of the flower is displeasing; and again in 8908 and 8909, where the colour does not agree with the description. Plates 8921, 8925 and 8926-27 also suffer from poor colouring and do justice neither to the plants nor to Miss Snelling's original paintings, this being particularly noticeable in the plate of *Paulownia lilacina* (8926-27).

The colouring of the plates, however, was carried out in the face of very great difficulties, not the least of which was that of finding suitable colourists, and special arrangements had to be made in order to get the plates coloured at all.

Fifty-seven plants are figured, of which 15 are species of *Primula*, among them a number of very rare and interesting plants, some of which are no longer in cultivation; the species figured are:

P. nipponica Yatabe (8881 A), *P. tenella* King ex Hook. f. (8881 B), a dwarf species from the high mountains of Tibet; *P. kisoana* Miq. (8884), *P. blattariiformis* Franch. (8893) and *P. bathangensis* Petitm. (8895), two representatives of the *Malvacea* section from western China; *P. helodoxa* Balf. f. (8899), *P. eburnea* Balf. f. & Cooper (8901), *P. Reginella* Balf. f. (8202 A), *P. dryadifolia* Franch. (8902 B), *P. heucherifolia* Franch. (8908), *P. florida* Balf. f. (8914), a dainty species from high altitudes in Yunnan; *P. Menziesiana* Balf. f. & W. W. Sm. (8916), from Bhutan, *P. Prattii* Hemsl. (8918), *P. aerintha* Balf. f. & Purdom (8922), with soft lavender-blue flowers, from Kansu and *P. rupestris* Balf. f. & Farrer (8932). Eleven species of *Rhododendron* are figured, namely, *R. zaleucum* Balf. f. (8878), *R. villosum* Hemsl. & Wils. (8880), *R. aureum* Franch. (8882), *R. insigne* Hemsl. & Wils. (8885), *R. brevistylum* Franch. (8898), *R. Traillianum* Forrest & W. W. Smith (8900), *R. melinanthum* Balf. f. & Ward (8903), *R. vernicosum* Franch. (8904-5), *R. afghanicum* Aitch. & Hemsl. (8907), *R. concinnum* Hemsl. f. *laetevirens* (Balf. f. ex Hutch.) Cowan (8912), *R. dauricum* L. var. *sempervirens* Sims (8930). The volume also includes four gentians, *G. Farreri* Balf. f. (8874-75), *G. Veitchiorum* Hemsl. (8883), *G. stragulata* Balf. f. & Forrest (8897), *G. dahurica* Fischer (8911), and three interesting gesneriads, *Briggsia Agnesiae* (Forrest) Craib (8896), *Oreocharis aurantiaca* Franch. (8915) and *Isometrum Farreri* Craib (8917). The remaining plants illustrated are *Colchicum atropurpureum* Stapf ex Stearn (8876), a plant known only in gardens and first distinguished as a new species by Dr. Stapf: it has leaves reminiscent of *C. autumnale*, but relatively small purple to deep magenta flowers, which recall those of *C. turcicum* Janka; *Rosa Farreri* Stapf forma *persetosia* Stapf (8877), raised from hips collected by Farrer (no. 774) in S. Kansu, the form figured is the very spiny one known in gardens as the "Threepenny-bit rose"; *Codnopsis subglobosa* W. W. Sm. (8879); *Heliophila longifolia* DC. (8886) a South African crucifer with brilliant deep blue flowers; *Viburnum fragrans* Bunge (8887); *Erodium corsicum* Leman (8888); *Cowania plicata* D. Don (8889-90), a Mexican plant with bright red flowers, like those of a single rose in appearance; *Frasera Parryi* Torr. (8891); *Dracocephalum calophyllum* Hand.-Mazz. (8892), a handsome free-flowering species with deeply and narrowly pinnatifid leaves and purplish-blue flowers crowded in a dense broad spike; *Rosa filipes* Rehd. & Wils. (8894) a rambler with large many-flowered panicles of white flowers, collected by Farrer in S. Kansu; *Lupinus saxatilis* Ulbr. (8906), from Peru; *Cyananthus neglectus* Marquand (8909), a new species known only from cultivated plants and probably originating from Yunnan, allied to *C. longiflorus* Franch. (Bot. Mag. t. 9387) but with smaller flowers; *Lysimachia phyllocephala* Hand.-Mazz. (8910); *Gerbera nivea* (DC.) Schultz (8913), a very attractive composite from the mountains of India and China, Nepal to Yunnan, with a neat basal rosette of leaves, white on the undersurface,

and a single large pendulous capitulum, which, in the plant figured, has pale rose ray-florets; *Schisandra sphenanthera* Rehd. & Wils. (8921); *Vaccinium glauco-album* Hook. f. ex C. B. Clarke (8924), a species of the eastern Himalaya from Sikkim to Burma, characterized, as is correctly stated in the text, by the vivid bluish-white undersurface of the leaves, the large glaucous-white bracts and pink flowers. None of these features, however, is shown in the plate, for the leaves are depicted pale green below, the bracts brown and the flowers deepest rose. Presumably the plant figured represents either a distinct form of the species, or the inflorescences had become discoloured before they were drawn. Whatever the explanation it is unfortunate that there is no reference to it in the text. *Veratrum Wilsonii* C. H. Wright ex Loes. f. (8925); *Paulownia lilacina* Sprague (8926-7), a new species figured from a plant grown at Kew, with large pale lilac flowers borne in erect pyramidal panicles, and large cordate leaves. *Kniphofia Galpinii* Baker (8928); *Pterocephalus Bretschneideri* (Batal.) Pritz. (8929); *Veltheimia Deasii* Barnes (8931), a South African species described in 1931, with undulate glaucous leaves and pink flowers which are flushed with green at the mouth; *Cirrhopetalum Farreri* W. W. Sm. (8933). Finally there two gladioli, *Gladiolus Blackwellii* L. Bolus (8919-20), a robust species with large pink-flushed flowers, and *G. crispulatus* L. Bolus (8923) a much smaller, slender species with 4-6 linear leaves and 1-3 deep rose flowers.

Of the articles that accompany the plates, 24 out of the 57 were written by the late Dr. Stapf, 11 are by Dr. J. M. Cowan, and the remainder were contributed by various members of the staffs at the British Museum, Edinburgh, and Kew.